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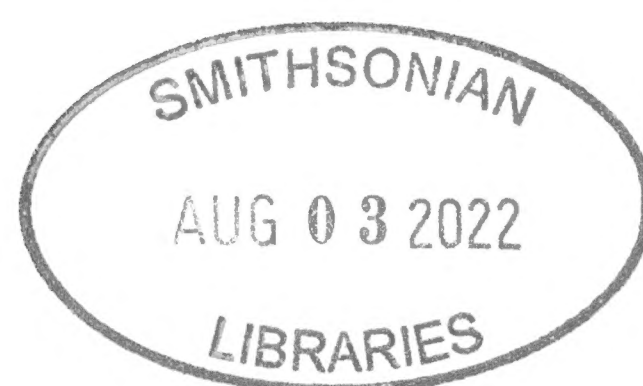
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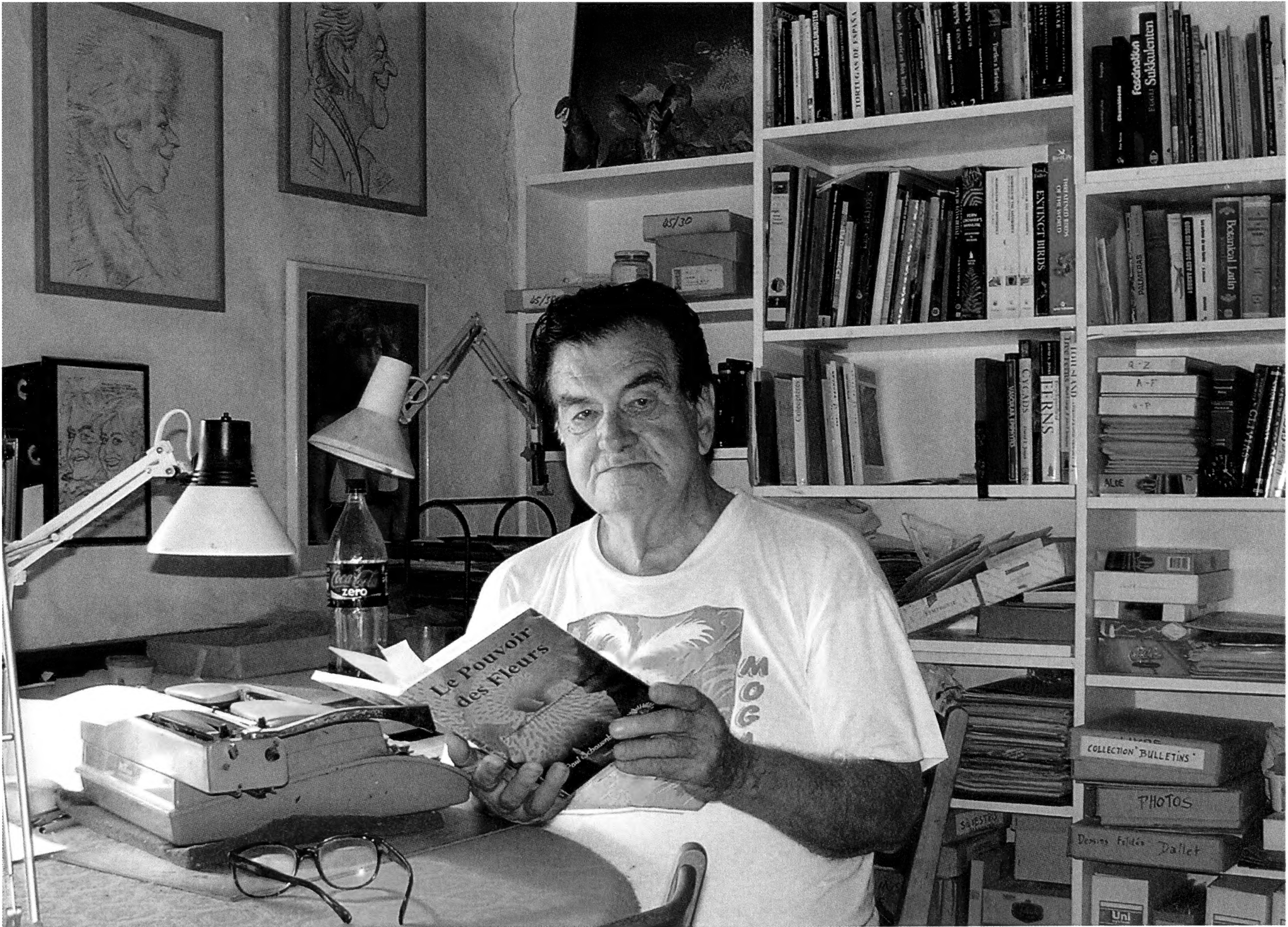


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Paul Schauenberg
1928-2019

Personnalité du monde de la zoologie hors du commun et vulgarisateur scientifique sans pareil, Paul Schauenberg s’est éteint à l’âge de 91 ans, le 12 juillet dernier à Mogan. C’est dans ce petit village de la Grande Canarie qu’il s’était retiré en 1988 pour y réaliser son dernier rêve, celui de créer un jardin botanique subtropical, loin du climat genevois trop sévère à son goût. Celles et ceux qui ont eu comme moi la chance de le côtoyer se souviendront de son esprit novateur et de son charisme, mais également de son érudition dans le domaine des sciences naturelles et bien entendu de ses travaux sur les félidés.

Le parcours de vie de Paul Schauenberg est loin d’être banal et c’est le moins qu’on puisse dire. Très jeune il développe un intérêt pour les sciences naturelles. Aussi va-t-il durant tout son temps libre sillonner la campagne genevoise pour y récolter des plantes, des nids, des têtards et une foule d’autres petits animaux qu’il va élever dans sa chambre pour les observer. À treize ans, il intègre la Société lépidoptérologique de Genève après avoir été parrainé par l’entomologiste Jean Carl, alors en poste au Muséum. Par ailleurs, il assouvit sa soif de connaissances par la lecture d’une multitude d’ouvrages sur les sciences



Paul Schauenberg dans son bureau du Jardin des Hespérides, aux Canaries.

naturelles et commence en autodidacte déjà bien informé à fréquenter le monde des naturalistes – très fermé à l'époque –, ainsi que les coulisses du Muséum d'histoire naturelle de Genève, encore sis au parc des Bastions. Les coulisses, et pas seulement, puisque très rapidement Pierre Revilliod, directeur de l'institution, se prend d'amitié pour le gamin, au point de lui ouvrir toutes les portes de son sérail, même hors des heures officielles de visite, et de lui faire part de ses travaux. Les collections scientifiques de cette institution gardent du reste encore quelques traces de ses passages, notamment trois nids de Rats des moissons collectés par ses soins en 1945 à Aïre, et qui s'avèrent être la seule preuve de l'existence sur le canton de Genève de ce petit rongeur aujourd'hui disparu. En 1945, il commence également un apprentissage d'horticulteur à Genève, qu'il terminera trois ans plus tard. Mettant à profit ses connaissances acquises à l'École d'Horticulture de Châtelaine, il cultive aussi des plantes bulbeuses dans un coin du jardin potager tenu par sa mère. Autre fait déterminant de sa future carrière, sa rencontre avec Henry Larsen, taxidermiste au Muséum, lequel va l'initier à son métier, et sans doute lui donner

le goût de l'aventure en lui narrant ses expéditions en Amérique du Sud. À cette époque, se doutait-il qu'il deviendrait, 20 ans plus tard, le premier ambassadeur du nouveau Muséum de Malagnou ?

En 1949, une année après avoir obtenu son diplôme d'horticulteur, sa soif d'aventure et de nouveaux horizons ne s'est pas tarie. En effet, c'est à cette date, à trois mois de ses 21 ans, qu'il s'embarque dans un paquebot pour l'Amérique du Sud, avec deux malles comme bagages et 400 francs dans la poche. Comme émigrant agricole, il va d'abord s'installer au Brésil, puis en Équateur après avoir été engagé par la compagnie bananière américaine *United Fruit Company*. Quel curieux début de parcours professionnel pour ce jeune homme qui ambitionne de devenir savant explorateur ! Cependant, ces premiers voyages ne sont pour lui qu'un prétexte pour fouler le sol sud-américain et y découvrir en trois dimensions le monde vivant et chatoyant de la forêt équatoriale qu'il ne connaît que par les écrits, les récits d'Henry Larsen et par les dépouilles des animaux conservés au Muséum de Genève. Aussi va-t-il étudier sans perdre de temps *in*



Paul Schauenberg dans les années 1950, photographiant un fourmilier.

vivo et *in situ* la faune et la flore de sa terre d'accueil, au point de devenir en quelques années l'un des meilleurs spécialistes de son temps de la faune de l'Équateur. Tant et si bien d'ailleurs que le WWF lui confiera quelques années plus tard une mission d'envergure, celle d'étudier la possibilité d'établir une réserve sur le versant oriental des Andes équatoriennes. En outre, toujours en Équateur, il mènera encore, en 1968, sur invitation du ministère de l'agriculture, une expédition de reconnaissance périlleuse sur les flancs amazoniens des Andes, dans une région restée totalement vierge, jamais cartographiée et jamais étudiée tant sur le plan botanique que zoologique, et cela afin d'y créer un parc national. Revenu de cette mission, il publiera, en 1970, dans le bulletin de la Société de géographie de Genève, un compte rendu fort détaillé sur le volcan El Reventador et la chute du Rio Coca.



Paul Schauenberg en compagnie d'une femme Colorado, en Équateur.

Mais revenons vers la fin des années 1950 où le jeune explorateur est de retour en Suisse. Par nostalgie de sa terre natale? Pas vraiment. Mais plutôt pour s'échapper avant qu'il ne soit trop tard de l'ambiance délétère qui règne dans les bananeraies et qui ne lui a pas vraiment permis de mener à bien ses ambitions initiales. En outre, il désire revenir à ses premières amours, à savoir les plantes et plus précisément les plantes bulbeuses qu'il se met à cultiver et à étudier avec une vision d'horticulteur certes, mais déjà avec celle d'un scientifique, bien qu'il ne soit pas encore diplômé. Comme à son habitude, il va lire tout ce qui a été écrit sur ces végétaux pour enfin publier en 1964, aux éditions Delachaux et Niestlé, un ouvrage de 384 pages presque complet sur le sujet. Mais durant cette

période, Paul Schauenberg n'en oublie pas moins son intérêt pour le monde animal. Aussi décide-t-il d'étudier la biologie de la Genette commune afin d'obtenir une reconnaissance académique pouvant lui ouvrir de nouvelles portes et surtout lui permettre de s'imposer dans le monde scientifique. Car à cette époque, et du reste encore aujourd'hui, peu d'autodidactes, si doués soient-ils, se voient reconnus par les hommes de science! Pour cela, il va se tourner vers le professeur Bruno Condé de l'Université de Nancy, qui, percevant en lui la graine d'un futur chercheur, décide de l'accompagner dans ses recherches en lui conseillant de faire un élevage de genettes, car les connaissances sur la biologie de cette espèce discrète sont à ce moment encore très lacunaires. Mais l'affaire n'est pas si simple, vu qu'aucun zoo ni aucun marchand ne sont capables de lui fournir un ou plusieurs individus dont la provenance soit certaine. Toutefois, sans baisser les bras, il finit enfin, après de longues recherches, par se procurer un couple dans une station d'élevage des Deux-Sèvres. Et aussitôt, il installe ses pensionnaires dans le domicile conjugal – il a eu encore dans l'intervalle le temps de se marier – non sans leur avoir construit au préalable un vivarium savamment équipé pour l'observation et la photographie nocturne. Ainsi, durant deux années, il va suivre jour et nuit ces animaux afin de consigner une foule incroyable d'observations inédites, notamment sur leur reproduction. Parallèlement, il va mesurer, peser et comparer des dizaines de dépouilles conservées sous forme de peau ou dans le formol, et éplucher plus de 200 publications sur le sujet, ce qui n'est pas rien pour cette époque à dix mille lieues d'Internet. C'est ainsi que le 25 juin 1964 il obtient son premier grade académique, un diplôme d'études supérieures de sciences naturelles de la faculté des sciences de l'Université de Nancy.

Le troisième chapitre de la carrière de Paul Schauenberg – si l'on peut dire – va débiter en 1965, presque simultanément avec le déménagement des collections du Muséum d'histoire naturelle de Genève au parc de Malagnou, où un bâtiment de 54 000 m³ couvrant une surface de 19 000 m² vient d'être achevé pour abriter les spécimens et accueillir le public. Or l'institution ne peut plus se satisfaire que de quelques collaborateurs scientifiques, d'un personnel administratif restreint à son minimum, et de trois ou quatre gardiens. Pour gérer ce nouveau musée, devenu le plus grand de Suisse, et lui donner tout l'éclat qu'il mérite, il faut rapidement engager du personnel dans tous les domaines, y compris dans celui des relations publiques. Pour cela un poste de conservateur chargé de la communication est mis au concours, lequel est remporté par Paul Schauenberg qui d'emblée séduit les examinateurs de son dossier de candidature et le Conseiller administratif au département des Beaux-Arts et de la Culture par ses compétences, son érudition et son charisme. De plus, le nouvel aspirant parle presque couramment une demi-douzaine de langues, ce qui est un atout pour un préposé aux relations extérieures.

Après avoir troqué son treillis de baroudeur et d'explorateur pour un costume cravate tiré à quatre épingles afin de satisfaire aux exigences de son poste, Paul Schauenberg prend son office au Muséum le 5 janvier 1965. Au cours de ses premières années dans l'institution, il se voit alors confier de nombreuses tâches et non pas seulement celles liées aux relations publiques. Dès le début de ses activités, il collabore avec ses collègues conservateurs à l'organisation des futures vitrines d'expositions. En outre, il a la responsabilité des animaux vivants qui vont être présentés au public dans le hall d'entrée du Muséum. Parmi ceux-ci figurent des roussettes, des iguanes, des caïmans, des pythons... Mais aussi un Alligator du Mississippi qui rapidement devient la mascotte de l'institution, et cela suite à une manifestation médiatisée qu'il conçoit pour le 150^e anniversaire du Muséum et au cours de laquelle il organise une pesée de l'animal en guise de concours. Aussi, comme il se charge personnellement de l'entreprise et devant les caméras, très vite Paul Schauenberg devient l'une des figures les plus prisées du monde médiatique. Il construit en outre dans son bureau un très grand terrarium dans lequel il installe trois Iguanes marins des Galápagos ramenés par ses soins, cela dans l'espoir de montrer cette espèce pour la première fois au public et avant qu'elle ne soit protégée par des conventions internationales. Car Paul Schauenberg ne veut pas faire de l'institution qu'une nécropole zoologique. C'est pourquoi, entre autres, il s'active en 1969, en étroite collaboration avec les membres de l'Aquarium-Terrarium Club de Genève, à mettre en place une exposition consacrée aux poissons d'aquarium, la plus importante du genre présentée en Suisse. Pendant un mois, le musée devient vivant, tant derrière les vitrines que dans les galeries où il règne certains jours une véritable ambiance de fête. Le succès de cette exposition est total ; en vingt-six jours, les huissiers enregistrent plus de 34 000 visiteurs. Par la suite, d'autres grandes manifestations conduites sous sa houlette verront le jour, attirant de plus en plus

de monde au Muséum, lequel deviendra bientôt l'une des institutions culturelles les plus médiatisées de Suisse romande. Mais en tant qu'« ambassadeur » du Muséum, il a bien entendu pour fonction d'établir et d'entretenir des contacts avec la presse écrite, la radio et la télévision, tâche qu'il entreprend presque avec dévotion. Pour cela il rédige des articles de vulgarisation pour des journaux romands et participe à de très nombreuses émissions de radio et de télévision, notamment avec le journaliste animalier Pierre Lang qui animera une émission intitulée « Rendez-vous » et dont les plus anciens d'entre nous se souviennent certainement. Durant toute sa carrière genevoise, Paul Schauenberg écrira ainsi plus d'un millier d'articles de vulgarisation et de chroniques diverses dans la presse romande. Par ailleurs, il va publier de nombreux ouvrages sur la faune et la flore, dont un livre sur les plantes médicinales en souvenir de sa mère et de ses talents d'herboriste, ainsi qu'une encyclopédie sur le Léman. Citons encore *La vie étonnante de nos oiseaux*, *Faune et flore de nos Alpes*, *Le langage secret des animaux*, *Le merveilleux monde des animaux* et une encyclopédie en 27 volumes intitulée *Le royaume des animaux* dont on lui confia la rédaction générale. Tous ces ouvrages et tous ses articles de vulgarisation, par ailleurs écrits dans un style qui lui était propre, témoignent de l'infini de son savoir qu'il n'a cessé d'alimenter tout au long de sa vie par la lecture de publications scientifiques. Et nombreux sont ses collègues du Muséum et d'ailleurs qui n'hésitèrent pas à le contacter lorsqu'ils étaient face à une question épineuse dans un quelconque domaine, sachant qu'il représentait souvent l'ultime recours pour obtenir une réponse. Véritable encyclopédie vivante, ses domaines de compétences dépassaient alors très largement la botanique et la zoologie.

Durant les dix premières années qui suivent sa prise de fonction de conservateur, Paul Schauenberg se voue corps et âme à faire rayonner le Muséum, lequel devient



Paul Schauenberg en 1968, avec un Tapir des Andes en captivité.



Paul Schauenberg (à gauche) au Muséum lors d'une interview pour l'émission « Sur demande » de la Télévision suisse romande en mai 1968.

presque son domicile principal. Tellement passionné par son travail, il entame ainsi très souvent des journées de douze ou treize heures y compris le week-end. Comment fait-il pour ne pas se diriger tout droit vers un *burn-out* et garder son sourire presque légendaire devant tous ceux qui le sollicitent ? Car en parallèle à son occupation principale, il faut savoir que Paul Schauenberg trouve encore le temps d'endosser par intermittence sa tenue d'explorateur pour partir en mission en Amérique du Sud, en Asie et dans les îles du Pacifique et de l'océan Indien, d'où il ramène des spécimens pour le Muséum et pour lesquels il écrit des articles scientifiques. En outre, il se met à étudier les félidés, sa nouvelle passion. C'est ainsi que son bureau, déjà envahi par des piles d'ouvrages et de publications scientifiques, va dès 1969 se transformer en station d'acclimatation pour petits félins venus des quatre coins du monde, notamment des Chats des sables, des Chats de Pallas, des Chats à pieds noirs et bien entendu des Chats sylvestres, qui, pour la plupart, transitent par le zoo de la Garenne tenu par son ami d'enfance Erwin Meier. En outre, désireux comme à son habitude de tout connaître sur les sujets qu'il étudie, il collecte des centaines de dépouilles et de crânes qu'il mesure, pèse et compare. Son bureau devient dès lors un second atelier de taxidermie d'où les odeurs commencent à envahir les couloirs de l'institution, d'autant plus qu'il lui arrive souvent d'éviscérer des cadavres pour en examiner les entrailles. «Après tout, disait-il avec sourire et bienveillance à ceux qui s'en offusquaient, sommes-nous oui ou non dans un muséum ?» De ses travaux de recherche sur les félidés vont naître de nombreux articles scientifiques qui aujourd'hui encore font référence dans le domaine. On lui doit entre bien d'autres publications sur le sujet, une étude sur la distribution historique du Chat sylvestre en Suisse extrêmement bien documentée ainsi qu'une méthode quasi infaillible pour identifier les crânes de chats domestiques de ceux du Chat sylvestre. Avec une thèse de doctorat sur l'indice crânien des félidés en prime, il devient ainsi l'un des spécialistes de cette famille les plus renommés de son temps et s'attire les faveurs des plus grands muséums d'histoire naturelle d'Europe, dont celui de Paris qui lui offre le titre de correspondant.

Cependant, en 1988, alors qu'il semble être parvenu – pourrait-on penser – à réaliser tous ses rêves d'adolescent, Paul Schauenberg décide encore une fois de se tourner vers de nouveaux horizons. Sans doute de moins en moins satisfait par les nouvelles directives de la Ville de Genève qui ne lui permettent plus de réaliser ses desseins trop en marge des courants politiques, il s'envole pour les îles Canaries en compagnie de sa dernière compagne, cinq ans avant sa retraite officielle. Loin des tracasseries administratives, il choisit de s'établir dans une vallée située près du village de Mogan, où il crée un jardin tropical, le Jardin des Hespérides. Paul Schauenberg, à soixante ans, n'hésite alors pas à retrousser ses manches ; il empoigne pioche et brouette, retournant ainsi à ses premières amours. Désormais, il va se consacrer à la culture d'une multitude d'essences fruitières et florales exotiques, de palmiers venus des quatre coins des tropiques, de plantes ligneuses rares et, entre autres, d'une riche collection de cactées. Cependant, il n'abandonne pas pour autant son besoin de communiquer : il organise des conférences en Suisse, publie des articles dans la presse, participe à des émissions de radio. Lors de visites commentées, son talent de narrateur lui vaut une belle reconnaissance de la part d'un public cosmopolite et surtout des membres de l'Association des Amis du Jardin des Hespérides, lesquels peuvent venir travailler dans ce lieu qualifié de magique. Mais au matin du 12 juillet 2019, comme toute vie a une fin, Paul Schauenberg s'éteint, dans son lit, comme il l'avait souhaité. Il aura réalisé tous ses rêves après avoir consacré un pan entier de sa vie à nous communiquer sa passion pour les sciences naturelles.

Jacques Gilliéron

Genève, le 13 février 2020

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Appendice 1 : principales publications de Paul Schauenberg

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Appendice 2 : taxons dédiés à Paul Schauenberg

Genre	
<i>Schauenbergia</i> Osella, 1977 (Coleoptera)	
Espèces	
<i>Aloconota schauenbergi</i> Pace, 1984 (actuellement dans <i>Geopora</i> ; Coleoptera)	<i>Imparipes schauenbergi</i> Mahunka, 1979 (Acari)
<i>Antilloppia schauenbergi</i> Mahunka, 1985 (actuellement dans <i>Neoppia</i> ; Acari)	<i>Multioppia schauenbergi</i> Mahunka, 1978 (actuellement dans <i>Multipulchroppia</i> ; Acari)
<i>Archiphthiracarus schauenbergi</i> Mahunka, 1988 (actuellement dans <i>Phthiracarus</i> ; Acari)	<i>Myllaena schauenbergi</i> Pace, 1984 (Coleoptera)
<i>Austrocarabodes schauenbergi</i> Mahunka, 1978 (Acari)	<i>Neoheligmonella schauenbergi</i> Vaucher & Durette-Desset, 1984 (Nematoda)
<i>Cryptacarus schauenbergi</i> Mahunka, 1977 (Acari)	<i>Pilobatella schauenbergi</i> Mahunka, 1977 (Acari)
<i>Gomyella schauenbergi</i> Johnson, 1985 (Coleoptera)	<i>Pseudanapis schauenbergi</i> Brignoli, 1981 (Araneae)
<i>Histiostoma schauenbergi</i> Mahunka, 1978 (Acari)	<i>Scheloribates schauenbergi</i> Mahunka, 1988 (Acari)
<i>Hoplophorella schauenbergi</i> Mahunka, 1978 (actuellement dans <i>Atropacarus</i> ; Acari)	<i>Scirtetinus schauenbergi</i> Frieser, 1980 (Coleoptera)
	<i>Scutacarus schauenbergi</i> Mahunka & Mahunka-Papp, 1988 (Acari)
	<i>Zygoribatula schauenbergi</i> Mahunka, 1978 (actuellement dans <i>Oribatula</i> ; Acari)

Révision taxonomique du genre *Messor* (Hymenoptera, Formicidae) au Maghreb et description de *Messor hodnii* sp. n., une nouvelle espèce de fourmi trouvée en Algérie

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Résumé : *Messor hodnii* n. sp. est une nouvelle espèce de Formicidae Myrmicinae du Chott El Hodna en Algérie. La description et l'illustration sont basées sur la caste d'ouvrière. Cette espèce fait partie des fourmis pourvues d'un psammophore et ressemble fortement à l'espèce *M. caviceps*. Nous proposons ici une clé du genre *Messor* au Maghreb (Afrique du Nord), intégrant la nouvelle espèce. Trente-six taxons de ce genre sont reconnus. De nouveaux statuts sont signalés à l'égard de *M. postquadratus*, *M. postpetiolatus*, *M. punctaticeps*, *M. sordidus* et *M. santschii* qui sont érigés en bonnes espèces. *Messor hesperius* est rétrogradé en sous-espèce comme *M. minor hesperius*. Nous recommandons d'attribuer un statut de protection pour *M. hodnii* n. sp. par l'Union Internationale pour la Conservation de la Nature (UICN) en la classant dans la catégorie d'espèces extrêmement en danger (CR).

Mots-clés : Formicidae - psammophore - paléarctique - Chott El Hodna - conservation - UICN.

Abstract: Taxonomic revision of the genus *Messor* (Hymenoptera, Formicidae) in the Maghreb and description of *Messor hodnii* sp. n. a new ant species found in Algeria.- *Messor hodnii* n. sp. is a new species of myrmicine ant from Chott El Hodna in Algeria. The description and illustration is based on the worker caste. This species has a psammophore and it strongly resembles *M. caviceps*. Here, we provide a key to *Messor* species in the Maghreb region (North Africa), integrating the new species. Thirty-six taxa of this genus are recognized. New statuses are reported: *M. postquadratus*, *M. postpetiolatus*, *M. punctaticeps*, *M. sordidus* and *M. santschii* which raised to species; *Messor hesperius* is demoted to subspecies level as *M. minor hesperius*. We recommend to the International Union for the Conservation of Nature (IUCN) to classify *Messor hodnii* n. sp. as critically endangered species (RC).

Keywords: Formicidae - psammophore - palearctic - Chott El Hodna - conservation - IUCN.

INTRODUCTION

Les fourmis Myrmicines moissonneuses du genre *Messor* sont distribuées principalement dans la région paléarctique (Bolton, 1982; Agosti & Collingwood, 1987; Cagniant & Espadaler, 1997). Bolton (2019) répertorie 120 espèces et 42 sous-espèces valides que l'on trouve dans les prairies, les zones semi-arides et les savanes de l'Ancien et du Nouveau Monde (Plowes *et al.*, 2013).

Une série de révisions taxonomiques pour le genre ont eu lieu au début du siècle dernier (Santschi, 1917, 1923, 1927; Wheeler, 1922; Finzi, 1929). Depuis, les taxonomistes modernes n'ont procédé qu'à des révisions

partielles, qui se limitent à des régions biogéographiques particulières ou à certains groupes du genre *Messor* comme Arnol'di (1977) dans l'ex-Union Soviétique, Bolton (1982) qui révisa les *Messor* afrotropicales et Bernard (1955) dans le bassin méditerranéen qui s'intéressa seulement au groupe *structor*. En Afrique du Nord, Bernard (1980) a apporté une révision du groupe *barbara* et ce même auteur en 1981 a révisé le genre *Messor* en utilisant les données biométriques. L'Algérie, vu son étendue et la diversité de ses conditions locales, possède encore des fourmis inédites. Le présent travail consiste en effet à la description d'une nouvelle espèce de *Messor* trouvée au Chott El Hodna. Cette fourmi a été identifiée

à tort dans la publication de Barech *et al.* (2016) comme *Aphaenogaster* sp. Cette confusion est due à la proximité des caractères morphologiques entre le genre *Messor* et le genre *Aphaenogaster* ainsi que le souligne Cagniant (2006) à propos de *M. boyeri*. Ici, nous corrigeons cette erreur et donnons les arguments morphologiques et écologiques qui en font une espèce nouvelle pour la science. En complément, nous présentons un essai de clé des *Messor* du Maghreb mise à jour par rapport à celle publiée par Cagniant & Espadaler (1997) pour le Maroc.

MATÉRIEL ET MÉTHODES

Matériel de comparaison : Photos examinées via <https://www.antweb.org/specimen/CASENT0907745>; syntype de *Messor caviceps* (Forel, 1902); Collection A. Forel, Muséum d'histoire naturelle de Genève (MHNG); Algérie, Souf, entre Maouiet Ferzan et Maouiet al-Caïd; sans date de capture.

D'autres spécimens de *M. caviceps* (Collection privée de Henri Cagniant) récoltés du Maroc ont été examinés.

Observations : Les observations des spécimens récoltés ont été effectuées par le biais d'une loupe binoculaire (Nikon SMZ-U). Les photos de l'holotype ont été obtenues par G. Cuccodoro (MHNG). L'acquisition d'images à différents plans focaux a été faite en utilisant une caméra Leica DFC425 en combinaison avec une loupe binoculaire Leica M205-C et le logiciel Zerene Stacker (version 1.04) pour le « focus stacking ».

Mensuration : Les mesures ont été faites suivant le travail de Bolton (2007) et Hita Garcia & Fisher (2013). Les mensurations sont prises à 75x (Micromètre paramétré 1 unité = 0,0133 mm). Toutes les mesures sont données en millimètres.

Abréviations : (TL) Longueur totale; (HL) Longueur de la tête; (HW) Largeur de la tête au niveau des yeux; (HWBE) Largeur de la tête derrière les yeux; (SL) Longueur du scape; (EL) Grand diamètre de l'œil; (PH) Hauteur du nœud pétiolaire; (PPH) Hauteur maximale du postpétiole; (ML) Longueur du mésosome; (PW) Largeur du pronotum; (PTW) Largeur du nœud pétiolaire; (PPW) Largeur du postpétiole.

Dépôt des types : L'holotype a été déposé au Muséum d'histoire naturelle de Genève. Le paratype est dans la collection privée de X. Espadaler à Barcelone.

RÉSULTATS

Messor hodnii n. sp.

Figs 1-3

Holotype : MHNG-ENTO-76668; 1 ouvrière; Algérie, Willaya de M'sila, Chott du Hodna, Medbah; altitude 392 m; WGS(84) 35.3525, 4.56250; date de collection

07.03.2011; collecté à la main par G. Barech et M. Khaldi.

Paratype : 1 ouvrière collectée dans les pots Barber le 30.04.2011. Même localité que l'holotype.

Etymologie : Le nom fait référence au site d'échantillonnage.

Diagnose : *Messor hodnii* n. sp. est très proche de *M. caviceps* qui a aussi de gros yeux (EL/HL = 0,28 pour une ouvrière *caviceps* de TL=5,7 mm). Chez *M. caviceps*, outre la gula concave, l'aspect est plus lisse, les rides en avant des yeux et sur les flancs n'existent pas; le tronc est plus clair que la tête et le gastre; le nœud du pétiole est étroit et haut (PH=0,37 chez l'ouvrière de 5,7 mm), la pilosité est plus courte (les plus longues soies ne dépassent pas 0,10 mm sur l'ouvrière de 5,7 mm) et moins fournie.

Description de l'ouvrière : Pour chaque paramètre des données biométriques, seules les mesures de l'holotype sont mentionnées ci-dessous.

TL (Lco dans la clé)=5,6; HL=1,38; HW=1,32; HWBE=1,16; SL=1,34; EL=0,37; Nombre d'ommatis-dies=20; ML=1,86; PTW=0,78; PH=0,33; PPH=0,38; PW=0,25; PPW=0,38.

Coloration brun rougeâtre, le gastre plus sombre. La tête est plus carrée chez l'holotype (HW/HL=0,96). La gula porte une trentaine de grandes soies courbées (psammophore), les plus longues mesurant jusqu'à un demi-millimètre chez l'holotype de 5,6 mm; œil bien développé (EL/HL=0,27) (Fig. 3); l'occiput dessine un large arrondi (Fig. 2). Le propodéum est inerme, plus ou moins caréné, avec un gros stigmat (Fig. 1). Le nœud du pétiole est arrondi au sommet, avec les deux faces égales; le postpétiole est campaniforme, une fois et demie plus large que le pétiole. La tête apparaît finement réticulée, plus lisse sur le front et l'occiput, mais avec quelques rides en avant des yeux. Le tronc porte une réticulation un peu plus marquée, des rides très fines apparaissent sur les métépisternes, les côtés et le dessus du propodéum; gastre finement alutacé à sa base. Des soies hérissent tout le corps, les plus longues atteignent 0,15 mm (Figs 1 et 3). Le processus métasternal est réduit. La massue antennaire est graduelle et ne ressemble pas à celle des *Aphaenogaster*.

Habitat et Ecologie

Le nouveau *Messor* a été prélevé à proximité de la sebkha dans sa partie sud, lieu-dit «Medbah», où des croûtes de sel couvrent la surface du sol (Fig. 4). Chott El Hodna est une zone humide à importance écologique internationale classée parmi les sites Ramsar depuis le 2 février 2001 (Ramsar, 2018), qui a conservé son état naturel. Le climat de ce lac salé est aride à hiver froid avec un total de précipitations de 128,9 mm et des températures moyennes annuelles égales à 20,6°C. Une longue période sèche est observée presque toute l'année (11 mois). Le sol est de texture sableuse, moyennement salé



Fig. 1. *Messor hodnii* n. sp., corps vue de profil.

et très pauvre en matière organique. La végétation est de type steppique, composée essentiellement de touffes appartenant à 10 familles botaniques, notamment des Astéracées (*Atractylis flava* Desf.), des Chénopodiacées [*Atriplex halimus* L. et *Halocnemum strobilaceum* (Pall.) M.B.], des Brassicacées (*Ammosperma* sp.), des Poacées [*Oropetium africanum* (Coss. & Durieu) Chiov. et *Aeluropus littoralis* (Gouan) Parl.], des Géraniacées (*Erodium* sp.), des Plantaginacées (*Plantago albicans* L.), des Plumbaginacées [*Limonium pruinosum* (L.) et *Limoniastrum* sp.], des Fabacées (*Retama retam* Webb.), des Térébinthacées (*Frankenia thymifolia* Desf.) et des Thyméléacées (*Thymelaea microphylla* Coss. & Dur.). Il faut noter la dominance des Chénopodiacées, représentées par des espèces halophytes. La parcelle d'échantillonnage contenait plusieurs terriers de rongeurs notamment ceux de *Psammomys obesus* Cretzschmar (Mammalia; Muridae) et quelques palmiers épars de *Phoenix dactylifera* L. (Arecacées) ont été repérés tout en se rapprochant de la sebkha (Fig. 4).

Messor hodnii n. sp. est probablement de mœurs nocturnes comme le suggèrent ses grands yeux. L'œil est toujours proportionnellement plus grand chez les petites ouvrières de *Messor* que chez les majors dont la tête devient très grosse; néanmoins il est ici plus grand que le quart de la longueur céphalique ($EL/HL = 1,27$) alors qu'il ne dépasse pas le cinquième chez des espèces franchement diurnes comme *M. capitatus* ou *M. barbarus* (EL/HL respectivement autour de 0,18 et 0,20 chez des petites ouvrières de 5,6 mm). *Messor hodnii* n. sp. est pourvue d'un psammophore bien développé qui permet de la classer parmi les fourmis arénicoles et xérophiles. Cette structure est petite ou inexistante chez les espèces vivant dans les habitats humides. La présence d'un psammophore est un caractère morphologique d'adaptation à la texture sablonneuse souvent rencontré chez certaines fourmis désertiques comme chez *M. arenarius* et *M. caviceps* (Wheeler, 1907). Ces dernières possèdent de longs poils implantés sous la tête, sur les mandibules et le clypéus qui ressemblent à une barbe. Le psammophore



Fig. 2. *Messor hodnii* n. sp., tête vue de face.



Fig. 3. *Messor hodnii* n. sp., tête avec psammophore.



Fig. 4. Site d'échantillonnage aux abords de Chott El Hodna.

serait un organe nécessaire à toutes les fourmis arénicoles vivant dans le sable vif (Santschi, 1909; Délye, 1968). Il fonctionne comme une pelle qui coince les boulettes de sable tassées contre la face inférieure de la tête. Le sable provenant du creusement, mais aussi celui accumulé par le vent, bouche régulièrement les ouvertures du nid ; il est ainsi plus facilement évacué (Délye, 1971). Il faut noter que chez ce nouveau *Messor*, il existe probablement de grandes ouvrières à grosse tête comme chez *M. vaucheri*. Les données disponibles ne sont que partielles du fait du manque des autres castes (mâle et reine). Dans le même site, d'autres *Messor* cohabitent avec *M. hodnii*, à savoir : *M. arenarius*, *M. striatulus*, *M. medioruber* et *M. picturatus* avec la présence de deux variétés, une de *M. medioruber* et l'autre de *M. picturatus* qui semblent être des formes originales du Chott El Hodna. Plusieurs investigations myrmécologiques ont été faites dans le même site de récolte à la recherche d'autres individus de la nouvelle espèce (2011, 2013, 2016 et 2019 : données non publiées). Différentes méthodes d'échantillonnage, notamment les pots Barber, récolte à main, Berlese, lavage du sol et appâts alimentaires ont été utilisées, mais aucune de ces méthodes n'a pu apporter de nouveaux spécimens. C'est pourquoi nous qualifions cette espèce de « rare et cryptique ». Medbah, qui est un site à conservation Ramsar, subit une forte dégradation environnementale ces six dernières années. Une usine agroalimentaire s'est installée en 2015 (distante de 1 km du site d'échantillonnage de *Messor hodnii*). Les rejets ménagers d'eaux usées de la population environnante sont déversés directement dans la sebkha. Nous signalons aussi dans ce même site des activités agricoles récentes (labours, pompage des eaux souterraines, l'utilisation des produits phytosanitaires et des fertilisants qui polluent l'environnement) ainsi qu'une activité pastorale intense (pâturage du cheptel ovin et caprin) qui rajoutent plus de pression. Ces différents facteurs sus-cités contribuent à la perte de l'habitat, ce qui augmente le degré de vulnérabilité de la fourmi en question. En conséquence, nos recommandations s'adressent à l'UICN pour le classement de cette espèce dans la liste rouge des espèces en danger. Selon l'UICN (2018) le classement des espèces dans les catégories d'espèces menacées s'opère sur la base des cinq critères d'évaluation suivants : (A) déclin de la population ; (B) aire de répartition réduite ; (C) petite population et déclin ; (D) très petite population ; (E) analyse quantitative. Il suffit qu'au moins un des critères A à E soit rempli pour qu'une espèce soit classée dans l'une des catégories En danger critique (CR), En danger (EN) ou Vulnérable (VU). Le cas de la nouvelle espèce remplit le Critère D : Population très petite ou restreinte, car elle présente un nombre d'individus matures inférieur aux seuils proposés (moins de 50 individus matures).

LISTE SYNOPTIQUE DES ESPÈCES DU GENRE *MESSOR* DU MAGHREB

Les noms sous-spécifiques qui sont ici requalifiés comme des taxa au niveau de l'espèce sont marqués avec **stat. n.** (nouveau statut).

- M. abdelazizi* Santschi, 1921
- M. aegyptiacus* Emery 1878
- M. antennatus* Emery, 1908
- M. arenarius* (Fabricius, 1787)
- M. barbarus* (Linné, 1767)
- M. berbericus* Bernard, 1955
- M. bernardi* Cagniant, 1967
- M. boyeri* Cagniant, 2006
- M. capitatus* (Latreille, 1798)
- M. caviceps* Forel, 1902
- M. erectus* Espadaler, 1997
- M. foreli* Santschi, 1923
- M. galla* Mayr, 1904
- M. grandinidus* Santschi, 1910
- M. hispanicus* Santschi, 1919
- M. hodnii* Barech, Khaldi, Espadaler & Cagniant **n. sp.**
- M. hoggarensis* Santschi, 1929
- M. lobicornis* Forel, 1894
- M. lusitanicus* Tinaut, 1985
- M. marocanus* Santschi, 1927
- M. medioruber* Santschi, 1910
- M. minor* (André, 1883)
- M. picturatus* Santschi, 1927
- M. rufotestaceus* (Foerster, 1850)
- M. postpetiolatus* Santschi, 1917 **stat. n.**
= *M. medioruber postpetiolatus* Santschi, 1917
= *M. barbarus st. postpetiolatus* Santschi, 1917
- M. postquadratus* Santschi, 1932, **stat. n.**
= *M. medioruber postquadratus* Santschi, 1932
= *M. sublaeviceps st. postquadratus* Santschi, 1932
- M. punctaticeps* Santschi, 1910 **stat. n.**
= *M. barbarus mediorubra punctaticeps* Santschi, 1910
- M. sanctus* Emery, 1921
- M. santschii* Emery, 1908 **stat. n.**
= *M. barbarus santschii* Emery, 1908f
= *M. carthaginensis* Bernard, 1980 **syn. n.**
- M. semirufus* (André, 1881)
- M. semoni* (Forel, 1906)
- M. sordidus* Santschi, 1917 **stat. n.**
= *M. barbarus sordidus tingitanus* Santschi, 1925
- M. striativentris* Forel, 1894
- M. striatulus* (Emery, 1891)
- M. structor* (Latreille, 1798)
- M. vaucheri* Emery, 1908

CLÉS DES ESPÈCES DE *MESSOR* DU MAGHREB

Cette clé est établie par l'un de nous (H.C.). Quelques localités nouvelles sont signalées à l'occasion.

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7B	Coloration fondamentalement sombre ; EL/HL autour de 0,20 chez les petites ouvrières	groupe <i>barbarus</i>

Groupe *arenarius*

Messor arenarius (Fabricius, 1787). Algérie : Bords de route de Medbah (Chott El Hodna) et à Oum Laadam (Réserve naturelle de Mergueb), espèce sabulicole atteignant les plages en Algérie (Brahim plage, côte oranaise) et Tunisie (Korba). Surtout Hautes Plaines, Atlas Saharien, nord du Sahara, Tripolitaine, Egypte ; est marocain (Bou Denid, Er Rachidia), non signalé du Maroc atlantique. (= *M. beduinus*, Emery 1922 ; de Kairouan).

Groupe *lobicornis*

Messor lobicornis Forel, 1894. Décrit de Terni (Oranie - Algérie). Chênaie verte de l'Atlas Blidéen à 1300 m, forêt mixte de Yakouren à 850 m, Djurdjura à 1766 m, Monts Babors à 2000 m. Espagne, Portugal ; nord du Maroc : Ifrane, Tazekka, Rif, entre 1200 et 1600 m.

- * forme nominale : gastre assez lisse, des épines. (= *batnensis* Forel, 1909) de Batna.
- * forme *submuticus* Emery, 1908 ; Aïn Draham (Tunisie). Gastre lisse, pas d'épines nettes (= *rugulosus* Santschi, 1926) de Laverdure, Constantinois (Algérie).
- * forme *normandi* Santschi, 1918 ; Dir el Kef (Tunisie). Gastre réticulé, mat ; petites épines ou simples denticules (= *laurenti* Santschi, 1939) de Trolard-Taza, près de Teniet el Had (Algérie). Maroc nord.

Groupe *vaucheri* et *caviceps*

1A	Corps brun jaunâtre à brun rougeâtre chez les majors, plus jaune chez les minors. Quasi lisse, quelques rides sur le propodéum. Lco=4,6-11,5 mm. Endémique marocain décrit d'Essaouira. Dunes littorales, forêt d'Ademine	<i>M. vaucheri</i> Emery, 1908
1B	Plus sombres ; réticulation plus ou moins distincte, mais présente	2

- 2A Gula un peu concave; de profil, la tête apparaît plate. Pétiole élevé, postpétiole campaniforme, plus large en arrière qu'en avant. Tête brun-noir, tronc brun-jaune, gastre brun foncé. Tête très finement réticulée, devenant de plus en plus lisse sur sa moitié postérieure; tronc et pétiole superficiellement réticulés, dessus du postpétiole lisse. Lco=4-7 mm. Région des Grandes dunes entre Touggourt et El Oued; Beni Abbès. Figuig *M. caviceps* Forel, 1902
- 2B Gula plane; pétiole à sommet arrondi. Brun rougeâtre, le gastre plus sombre. Réticulation fine, mais distincte sur le tronc et les pétioles. Tête finement réticulée, devenant plus lisse sur le front et l'occiput, mais avec quelques rides en avant des yeux. Lco= 5,6 mm. Medbah (Chott el Hodna - Algérie) *M. hodnii* Barech, Khaldi, Espadaler & Cagniant, n. sp.

Groupe *minor* et *medioruber*

- 1A Premier tergite du gastre glabre ou avec seulement quelques poils (en plus de la bordure postérieure), jamais poilu sur toute sa surface 2
- 1B Gastre poilu sur toute sa surface 11
- 2A Propodéum épineux; épaules anguleuses 3
- 2B Propodéum sans épines nettes; épaules arrondies 4
- 3A Tête et tronc rouge plus ou moins vineux *M. aegyptiacus* Emery 1878
 * forme nominale: Le Caire.
 * ssp. *tunetinus* Santschi, 1923; Kairouan. Epines un peu plus courtes; bordure Nord Saharienne du Maghreb.
- 3B Noir en entier ou thorax maculé de rouge très sombre *M. foreli* Santschi, 1923
 * forme nominale de Tozeur; épines assez longues, fines, un peu incurvées.
 * forme *fossulatus* Santschi, 1923; Kairouan; tête relativement bien striée, épines moyennes, dentiformes, droites dans le plan propodéal. (= *surcoufi* Santschi, 1923) d'El Goléa (Algérie).
 * forme *brevispinosus* Santschi, 1923; Côte atlantique du Sahara, sud du Grand Atlas; tête lisse vers l'occiput; épines réduites à des denticules, mais relevées.
- 4A Ouvrières ne dépassant pas 8 mm si foncées; sinon avant-corps rouge franc ou bicolores. Pétiole généralement tronqué obliquement 5
- 4B Plus grandes, jusqu'à 10 mm; coloration généralement brune. Pétiole en pain de sucre, arrondi au sommet. Propodéum à fortes carènes, mais sans dents. Aspect lisse *M. grandinidus* Santschi, 1910
 * forme nominale. Kairouan. Coloration brun café au lait. (= *mixtus* Santschi, 1927) de Kairouan; avant-corps rougeâtre. Algérie: Forêt El Haourane (M'sila) de 946 à 1100 m, Djebel Messaad (M'sila) à 1107 m.
 * forme noire du Maroc: Marrakech, Ouarzazate.
- 5A Avant-corps rouge 6
- 5B Colorations différentes 7
- 6A Pétiole bas, la face supérieure plus courte que la postérieure. Rouge sur la tête, tronc et pétioles. Tête presque lisse, rides du tronc peu visibles *M. semirufus* (André, 1881)
 * forme nominale: Proche-Orient; angle du propodéum à peu près droit.
 * ssp. *pharisanicus* Bernard, 1953 du Fezzan. Angle du propodéum d'environ 120°.
 * ssp. *oblica* Santschi, 1929 du Hoggar. Angle plus obtus, 140°.
- 6B Pétiole plus élevé, face supérieure égale ou plus courte que la postérieure. Maghreb *M. picturatus* Santschi, 1927
 * forme nominale de Mascara; tête, tronc et pétioles maculés de brun, pattes noires. Reine pratiquement toute noire. Hautes Plaines d'Algérie: Djebel Maadid (Bordj Bouarreridj) à 1408 et 1535 m, forêt Haourane (M'sila) de 946 à 1100 m, Atlas saharien. Haut Atlas central, Tazekka.
 * forme *maura* Santschi, 1927 de Kairouan. Avant-corps rouge peu ou pas maculé de brun, pattes fauves. Reine avec le front rouge. Littoral algérien et marocain, Marrakech.
- 7A Corps noir mat; gastre pubescent mais sans poils dressés. Pronotum bien ridé en travers, vertex et gastre réticulés. Pétiole élevé. Petite (Lco=4,0-7,0 mm) *M. sanctus* Emery, 1921
 * forme nominale de Kairouan; Constantinois et Algérois.
 * ssp. *obscuriventris* Karawaiev, 1912 de Tlemcen; semble introduite au Maroc, lieux pâturés.
- 7B Au moins le tronc partiellement plus clair que la tête et le gastre 8

- 8A Propodéum rectangulaire, parfois subdenté; pétiole épais, tronqué en biais assez bas. Dos rouge vineux. Tête luisante à peine chagrinée. Espèce saharienne des dunes. Touggourt (Algérie)*M. postquadratus* Santschi, 1932
- 8B Propodéum arrondi; espèces du Maghreb (sauf *hoggarensis*) 9
- 9A La tête, les pétioles et le gastre noirs contrastent avec le tronc jaune orangé, à peine rembruni sur le propodéum. Très luisant, promésonotum superficiellement striolé, en grande partie lisse. Pétiole écailleux; postpétiole un peu cupuliforme, assez gros. Mogador; Maroc, introduit en Espagne. De l'océan aux contreforts des Atlas, Marrakech, Ouarzazate; semble absent dans le Rif*M. marocanus* Santschi, 1927
- 9B Différent; moins luisant, tête partiellement ridulée; pétiole plus ou moins tronqué au sommet; coloration plus ou moins assombrie 10
- 10A Tête luisante, sans rides nettes; tête et gastre noirs, tronc brun rouge. Parfois quelques poils sur l'arrière du gastre. Pétiole assez haut, sa face arrière plutôt arrondie, sommet plus ou moins échancré*M. medioruber* Santschi, 1910
- * forme nominale de Kairouan. Thorax rouge, tête lisse.
- * forme *sublaeviceps* Santschi, 1927 de Tunis. Tête un peu moins luisante, tronc plus ou moins assombri. Forme la plus commune, tout le Maghreb, de la mer aux Atlas. Algérie: Forêt El Haourane (M'sila) à 946 m, Oum Laadam dans la Réserve Naturelle de Mergueb, Akfadou à 874 m.
- * forme *montanus* Santschi, 1927 décrite de Laverdure. Thorax rouge sombre, sculpture plus accusée; tête plus mate, très finement chagrinée. Propodéum subdenté; pétiole tronqué en biais. Atlas telliens, tunisiens et marocains.
- 10B Tête distinctement et finement ridée sur le front et les joues, les rides ne s'effaçant qu'à l'occiput. Tronc nettement ridé. Pétiole tronqué obliquement. Tête brun rouge sombre, tronc à peine éclairci, gastre noirâtre. Hoggar, Sud marocain et plages près d'Agadir*M. hoggarensis* Santschi, 1929
- 11A Noires, petite taille (Lco=3,2-6,5 mm) 12
- 11B Avant corps rouge, bicolore ou brun foncé, plus grandes (Lco=4,0-8 mm) 13
- 12A Pétiole élevé, tranchant au sommet; propodéum subdenté. Poils du gastre bien développés. Péninsule Ibérique (décrit de Calatrava), Cap Spartel, Tanger, Ceuta, Rif, Tazekka*M. hispanicus* Santschi, 1919
- 12B Petites épines fines; pétiole triangulaire, plus large. Poils très fins et courts. Portugal, Espagne, Tanger*M. lusitanicus* Tinaut, 1985
- 13A Avant-corps rouge; petites (Lco=3,7-6,8 mm)*M. minor* (André, 1883)
- * forme nominale de Naples; Italie, Corse, Sardaigne; pétiole tronqué en biais. Parfois introduite dans des ports d'AFN.
- * ssp *hesperius* Santschi, 1927 de Ténériffe; peu différent du type.
- * ssp du Maroc à pétiole en sifflet; régions littorales, mais aussi dans l'intérieur (Bou Arfa).
- 13B Bicolore ou sombre 14
- 14B Pas d'épines nettes 15
- 14B Des épines ou des lobes 16
- 15A Tête et gastre noir-brunâtre, tronc rouge sombre. Propodéum arrondi ou subdenté (grandes ouvrières >7 mm), pétiole en pain de sucre, assez haut, postpétiole devenant plus large que long chez les grandes ouvrières > 7 mm. Sculpture peu marquée. Lco=3,8-8,4 mm. Kairouan. Non retrouvé*M. postpetiolatus* Santschi, 1917
- 15B Pas ces caractères; plus franchement bicolore. Propodéum un peu anguleux; pétiole en pain de sucre assez épais; postpétiole normal. Tête et tronc densément ponctués, gastre peu chagriné. Lco=3,4-7,9 mm. Tunis. Maroc, surtout au sud (Marrakech, Sirwa, Saghro)*M. punctaticeps* Santschi, 1910 (= *striaticeps* sensu Forel 1902 de Tebessa; le vrai *striaticeps* est du Caucase).
- * forme nominale de Tunis. Franchement bicolore; il existe aussi des formes assombries en Tunisie et Algérie.
- * forme marocaine souvent foncée, parfois noire. Surtout au sud (Marrakech, Sirwa, Saghro).
- 16A Epines fines. Pétiole en sifflet. Gastre bien pileux. Sombre, pro et mésonotum à nuances rougeâtres. Tête plus ou moins ridée en long, pronotum et propodéum élégamment ridés en travers, gastre un peu réticulé. Lco=4,0-8,5 mm. Relève le gastre s'il est inquiété. Haut Atlas de Marrakech*M. erectus* Espadaler, 1997

- 16B Epines épaisses ou des lobes. Le gastre peut ne pas être totalement poilu. Tronc plus clair que la tête et le gastre ou assombri 17
- 17A Gastre plus ou moins alutacé. Tête et pronotum ridulés-réticulés, partiellement lisses. Tronc typiquement plus clair que la tête et le gastre. Pétiole tronqué en biais. La pilosité du gastre est plus ou moins dense et les épines varient de la petite pointe à un lobe conséquent. Algérie-Tunisie ; Maroc, surtout méridional, plus rare au Maroc atlantique ; se mélanise en altitude ou sur sable (Ademine). Lco=4-9 mm *M. striatulus* (Emery, 1891)
 * forme nominale à gastre luisant.
 * forme *falcistriae* Santschi, 1939 près de Bordj el émire Abdelkader (=Trolard-Taza, Ouarsenis). Gastre densément ponctué et mat chez les majors, mais les petites ouvrières conservent un gastre assez lisse.
- 17B Gastre mat même chez les petites ouvrières, prenant un aspect moiré chez les majors. Aspect général mat à cause de la ponctuation ; tête finement ridée en long, sans plages lisses ; tronc confusément ridé en travers, épines épaisses, incurvées vers le bas, nœuds ridés ponctués. Noirâtre, le thorax rouge obscur. Lco=3-7 mm. Les Trembles (près de Tlemcen). Ouarsenis, Atlas saharien. Rif *M. striativentris* Forel, 1894

Groupe *structor*

- 1A Brunâtre, propodéum arrondi. Espèce européenne (Brive) introduite (Casablanca, Fès) *M. structor* (Latreille, 1798)
- 1B Noire ; propodéum anguleux 2
- 2A Tête devenant lisse à l'occiput, mésonotum lisse et luisant. Rides sur les épaules en cercles concentriques, gastre lisse. Chelia ; Aurès et Belezma. Maroc en montagne : Moyen Atlas, Tazekka, Bou Iblane ; rare dans le Haut Atlas (1600-2400 m) *M. berbericus* Bernard, 1955
- 2B Tête complètement ridée en long, pro-mésonotum confusément ridée en travers, gastre plus ou moins réticulé ou strié 3
- 3A Gastre lisse ou un peu réticulé. Atlas marocains *M. abdelazizi* Santschi, 1921
- 3B Gastre nettement strié en long. Montagnes de l'Algérois *M. bernardi* Cagniant, 1967

Groupe *antennatus*

M. antennatus Emery, 1908 ; décrit d'Essaouira. Endémique marocain, du littoral jusqu'au Sirwa.

* forme nominale brun jaunâtre clair de basse altitude

* forme *personatus* Santschi, 1931 de Reraia (Atlas de Marrakech, près d'Asni) ; montagnarde, plus foncée, presque brune noirâtre ; plateaux des Lacs, Atlas de Beni Mellal.

Groupe *rufotestaceus*

- 1A Pétiole arrondi ; allure grêle. Nœuds bas, pattes et antennes longues ; yeux grands. Corps roux, gastre rembruni ; luisant. Ouvrières à faible dimorphisme (Lco=4-6 mm) ; pilosité éparses et assez longue. Nocturne. Proche-Orient, Tassili ; signalé de Beni Ounif (SW algérien, proche de Figuig) *M. rufotestaceus* (Foerster, 1850)
- 1B Pétiole avec un nœud triangulaire. Comme le précédent, mais gastre noir ; polymorphisme marqué (Lco=4-10 mm). Assa Tagoumait (région de Laâyoune) *M. boyeri* Cagniant, 2006

Groupe *barbarus*

- 1A Noir ou avec la tête rouge. Les deux faces du propodéum font un angle obtus ou leur jonction est anguleuse 2
- 1B Brun jaunâtre, le bout du gastre rembruni. Les deux faces du propodéum sont en angle droit reliées par un arrondi. Pétiole en pain de sucre étroit au sommet. Souterraine, nocturne *M. sordidus* Santschi, 1917
 * forme nominale d'Andalousie.
 * ssp *tingitana* Santschi, 1925. Tanger, Moyen Atlas.
- 2A Propodéum anguleux, voire subdenté chez les majors. Tête plus ou moins ridée, pas nettement rouge 4
- 2B Propodéum arrondi ou obtus, sans dents. Tête rouge ou corps brun jaunâtre 3

- 3A Noire avec la tête rouge, au moins des reflets rouges. Reines avec la tête rouge. Propodéum arrondi, sa face déclive peu concave. Maghreb et Europe méditerranéenne. Tête pas plus large que longue chez les majors extrêmes. Les deux faces du propodéum font un angle obtus, la déclive plus ou moins inclinée *M. barbarus* (Linné, 1767)
 * forme nominale à tête franchement rouge cerise de «Barbaria» (AFN). Tout le Maghreb, souvent en lieux habités.
 * forme *politus* Karawaiev, 1912 de Tlemcen, tête rouge, tronc vineux, gastre brun noirâtre.
 * forme *dentiscapus* Forel, 1909 d'Hammam Meskoutine (près de Guelma, Constantinois). (= *ambiguus* Santschi 1925) de Kairouan; tête et avant du pronotum rouges, pattes rouges; les petites ouvrières sont rouges-brunâtre sur presque tout l'avant-corps; propodéum en angle très obtu.
 * forme *gallaoïdes* Santschi, 1929 de Skir (?) Maroc. La tête n'a que des reflets rouges, mais la reine a la tête rougie; propodéum rectangulaire, mais l'angle est arrondi. Voisin du *M. barbarus nigriceps* Santschi, 1925 de Caceres, Estrémadure, qui a le propodéum plus obtus.
- 3B Ethiopie, Afrique noire. Tête plus large que longue chez les majors extrêmes. Avant-corps, pattes et pétioles rouge foncé, le gastre noir devenant rougeâtre à la base chez les majors, minors noires en entier. Lco=3-12 mm. Tête très lisse et luisante, quasi sans rides, quelques stries sur la ligne médiane. Propodéum en angle presque droit, pétiole élevé, tronqué *M. galla* Mayr, 1904
 * forme nominale d'Ethiopie; assez variable. (= var. *rufa* Forel, 1910); (= var. *nobilis*, Santschi, 1928); (= var. *obscurus* Menozzi & Consani, 1952). Aurait été signalé du Sahara.
 * var. *armata* Emery, 1922 du Ghana à dentation plus nette.
 * var. *triempressa* Santschi, 1917 du Tchad, plus sombre.
 * var. *latinoda* Santschi, 1917 d'Afrique orientale, postpétiole un peu élargi.
- 4A Brun jaunâtre-rougeâtre. Propodéum nettement anguleux, mais sans spinulation; les 2 faces font un angle obtus et la face déclive est très concave. Pétiole élevé tronqué oblique. Tête lisse, dos peu ridé, les rides des flancs et du propodéum faibles. Lco=4-12 mm. Décrite de Kairouan; Algérois *M. santschii* Emery, 1908
- 4B Propodéum plus ou moins denticulé, tête en partie ridée. Noires 5
- 5A Tête finement ridée en long; des ridules sur le dos, plus nettes et sinueuses sur les flancs et sur les nœuds; gula densément poilue (presque un psammophore). Noire; insertion des mandibules rouge. Des ébauches d'épines visibles. Pétiole bas et massif, face dorsale inclinée plus longue que la postérieure. Lco=3,5-9 mm *M. semoni* (Forel, 1906)
 * forme nominale décrite de Mechroha (=Laverdure, Constantinois). Peut-être une forme locale de *M. capitatus*
- 5B Rides de la tête faibles; pronotum à peine ridulé. Gula moins poilue. Typiquement noire. Les deux faces du propodéum font un angle presque droit, la face déclive peu concave. Nœud du pétiole un peu triangulaire, sa face postérieure arrondie. Tête presque sans rides, luisante, thorax lisse sur le dos, faibles sur le propodéum, mais bien dessinées sur les mésépisternes et métépisternes. Lco=4-3 mm. Les reines ont toujours la tête noire. Espèce européenne *M. capitatus* (Latreille, 1798)
 * forme nominale d'Europe occidentale. Décrite de Bordeaux. Introduite çà et là au Maghreb. Algérie: Djebel Maadid (Bordj Bouarreridj) à 1535 m, Forêt Haourane (M'sila) à 1100 m.
 * population marocaine très voisine: ssp. *nigricans* de Kenitra Santschi, 1929; Atlas. Idem.
 * forme *splendens* Karawaiev, 1912; Constantine. Très luisante; un peu rougeâtre. Non retrouvée.

Note à propos de la rétrogradation de *M. hesperius*

De nouveaux exemplaires reçus depuis 1997 (en particulier de Corse et de Tunisie) montrent que la forme du pétiole (plus ou moins tronqué dessus) est variable d'une population à l'autre et dans une moindre mesure, à l'intérieur d'une même population. C'est pourquoi, considérant que *M. minor* présente une distribution relativement large (Italie, France, Maroc, Algérie, Tunisie, Canaries), nous préférons rétrograder la population canarienne au rang de population géographiquement circonscrite de *M. minor*, c'est-à-dire de sous-espèce.

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taxonomiques et bibliographiques du genre *Messor* disponible sur Antweb et Antcat.

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The first description of the female of *Heliophanus xerxesi* Logunov, 2009 (Araneae: Salticidae) from Iran

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Abstract: The previously unknown female of the jumping spider *Heliophanus xerxesi* Logunov, 2009 from Iran is described, diagnosed and illustrated. A map showing all the collecting localities of this species is provided.

Keywords: Taxonomy - jumping spiders - unknown sex.

INTRODUCTION

Heliophanus C.L. Koch, 1833 is one of the largest genera in Salticidae, containing 169 valid species (World Spider Catalog, 2019). Wesółowska (1986) divided this genus into three subgenera and many species groups; the largest subgenus, *Heliophanus*, was divided into 12 species groups.

Currently, 14 *Heliophanus* species are known from Iran (Zamani *et al.*, 2019). *Heliophanus xerxesi* Logunov, 2009 was described on the basis of the male holotype collected in Kerman Province, southern Iran. Based on the conformation of the male and female copulatory organs, this species seems to be a member of the “*auratus*” species group (*sensu* Wesółowska, 1986), but differs from other members of this group by the absence of a large protuberance at the embolic base.

The aims of this paper are: (1) to describe the female of *H. xerxesi* for the first time and (2) to map all occurrences of this species.

MATERIAL AND METHODS

The studied specimens are deposited in the following museums (curator names in parentheses): ISEA = Institute of Systematics and Ecology of Animals, Novosibirsk, Russia (G.N. Azarkina); MMUE = The Manchester Museum, University of Manchester, UK (D.V. Logunov). The body coloration refers to alcohol-preserved specimens. All drawings were made with the aid of a reticular eyepiece attached to a MBS-10 stereomicroscope. The epigynes was detached and

macerated in 20% KOH solution overnight. Photographs were taken with a Canon EOD 550D camera attached to a Zeiss Stemi 2000-C. Images were stacked with Helicon Focus 6.3 software at the Institute of Systematics and Ecology of Animals. All drawings and photos were edited and assembled in Adobe Photoshop CS5. All measurements are in mm. Legs were measured on the dorsal side and measurements are given in the following manner: total length (femur + patella + tibia + metatarsus + tarsus). For leg spination the method of Ono (1988) is followed. The distribution map was compiled using the online mapping software SimpleMappr (Shorthouse, 2010).

Abbreviations: ALE = anterior lateral eye; AME = anterior median eye; ap = apical; d = dorsal; EW = epigynal wings; Fm = femur; Mt = metatarsus; pr = prolateral; PLE = posterior lateral eye; Pt = patella; rt = retrolateral; Tb = tibia; v = ventral.

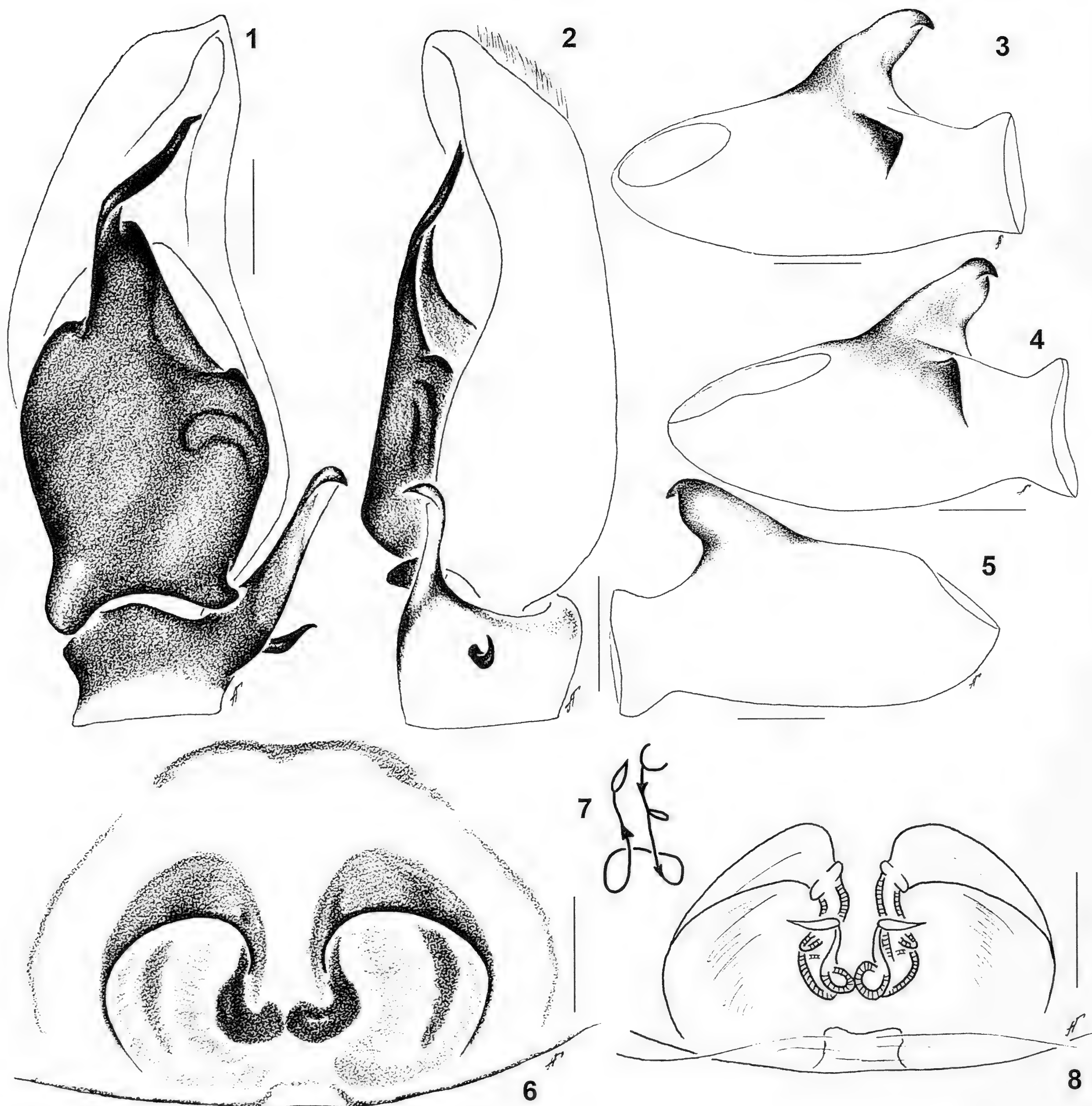
RESULTS

Family Salticidae Blackwall, 1841
Subfamily Salticinae Blackwall, 1841
Tribe Chrysillini Simon, 1901
Genus *Heliophanus* C.L. Koch, 1833

Heliophanus xerxesi Logunov, 2009
Figs 1-13

Heliophanus xerxesi Logunov, 2009: 905, figs 13-17.

Material examined: MMUE G7635.1; 1 male, 1 female; IRAN, Ilam Province, Darrekh Shank,



Figs 1-8. *Heliophanus xerxes* Logunov, 2009. (1-2) Male palp, ventral and retrolateral view. (3-5) Male palpal femur, prolateral (3-4) and retrolateral (5) view. (6) Epigyne, ventral view. (7) Diagrammatic course of insemination ducts. (8) Vulva, dorsal view. (1-3, 5) Specimen from Markazi Province. (4, 6-8) Specimens from Ilam Province. Scale bars 0.1 mm.

Kabirkuh, c. 32°54'N, 47°44'E; III.2015; collector unknown. – ISEA 001.8437; 1 male; IRAN, Markazi Province, Tafresh County, c. 8 km SW of Tafresh, river valley, 34°37'30-37"N, 49°56'46-49"E, 2300-2312 m a.s.l.; 29.V.2017; leg. O.E. Kosterin.

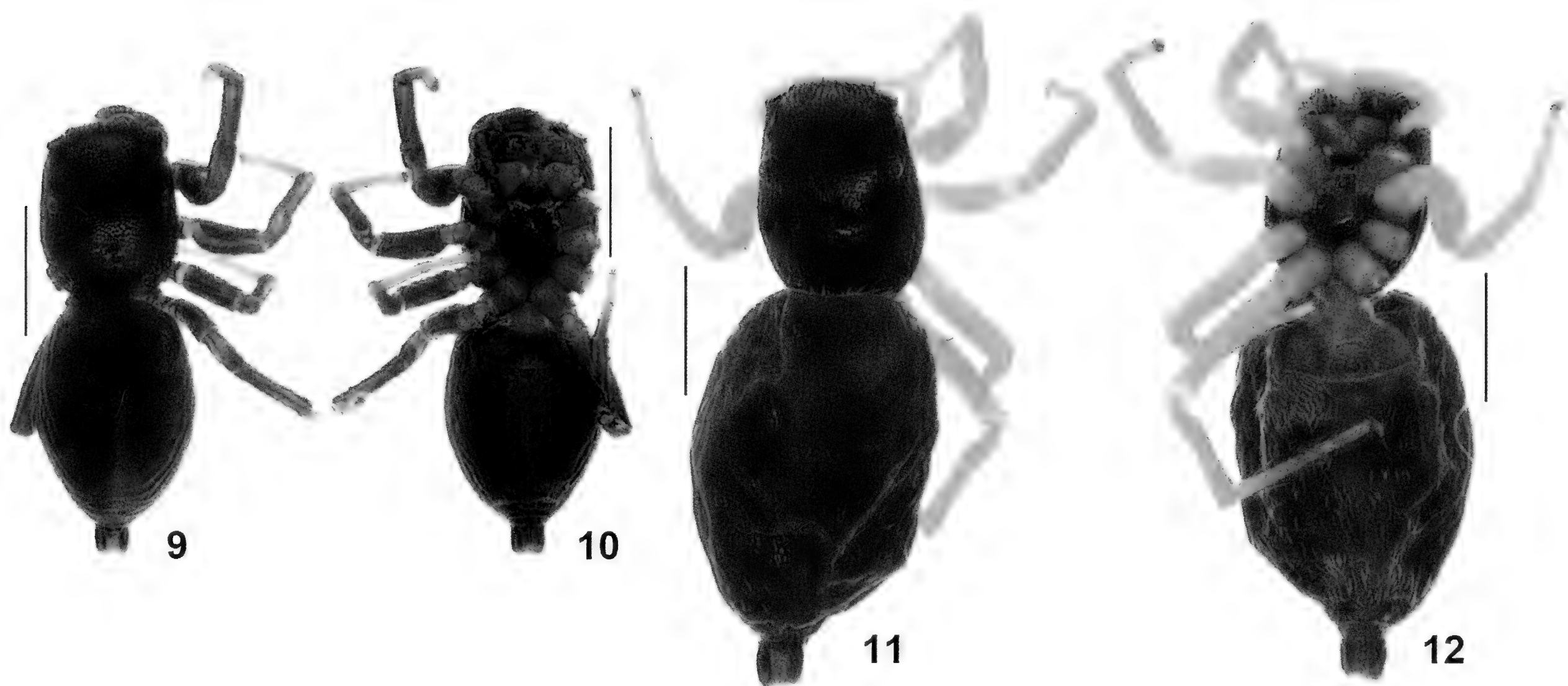
Extended diagnosis: The female copulatory organs of *H. xerxes* are similar to those of *H. forcipifer* Kulczyński, 1895, but differ in having larger epigynal wings (Fig. 1 cf. Rakov & Logunov, 1997: fig. 81) and markedly smaller spermathecae (Fig. 3 cf. Rakov &

Logunov, 1997: figs 82-83). For the diagnosis of the male, see Logunov (2009).

Description:

Male: See Logunov (2009). The studied male is illustrated in Figs 1-5, 9-10.

Female: Carapace 1.70 long, 1.30 wide, 0.75 high at PLE. Ocular area 0.75 long, 1.05 wide anteriorly and 1.05 wide posteriorly. Diameter of AME 0.35. Abdomen 2.70 long, 1.90 wide. Cheliceral length 0.50. Clypeal height 0.05. Length of leg segments: I 2.65 (0.80 +



Figs 9-12. Habitus of *Heliophanus xerxesi* Logunov, 2009. (9-10) Male from Ilam Province, dorsal and ventral view. (11-12) Female, dorsal and ventral view. Scale bars 1 mm.

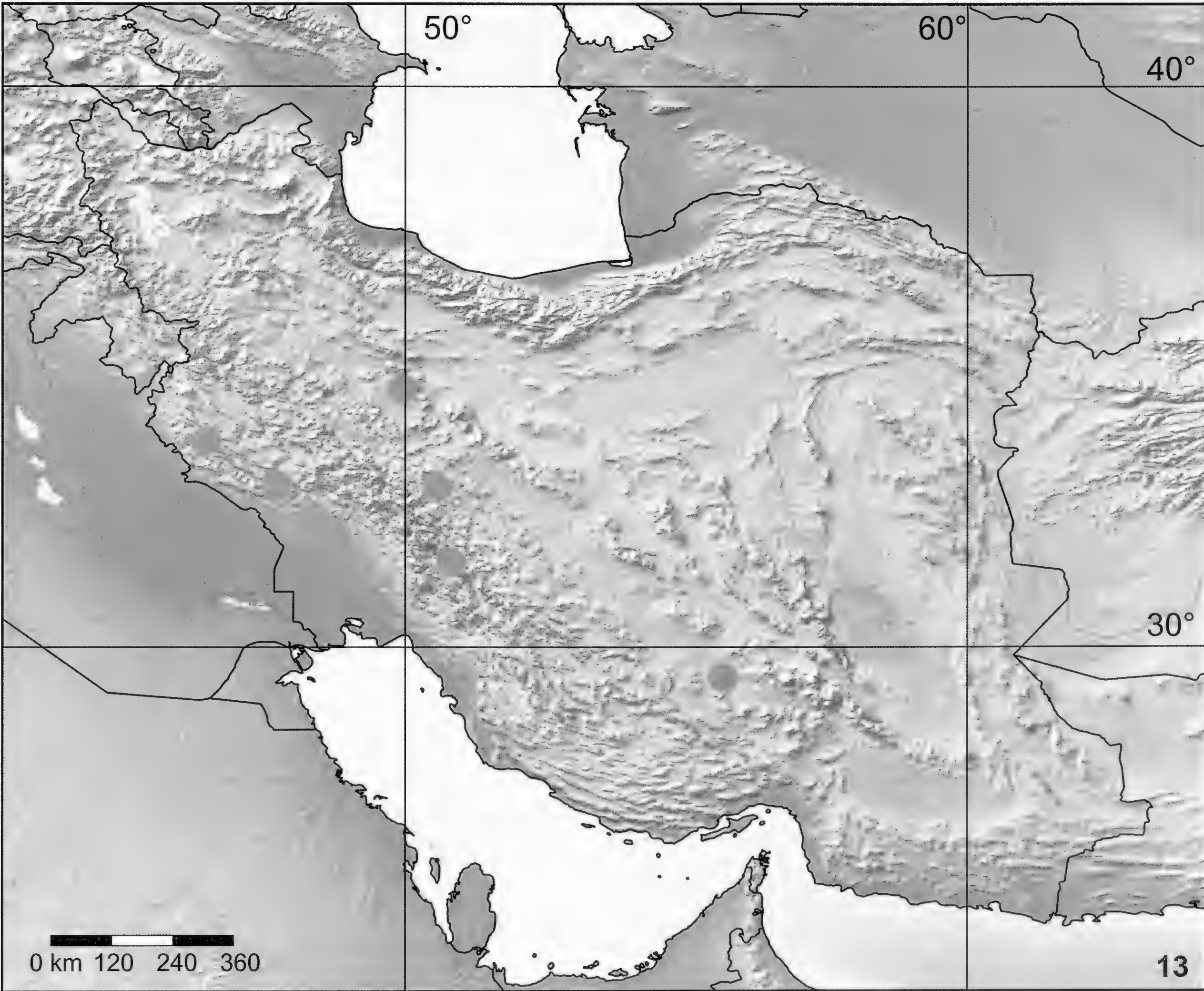


Fig. 13. Collection localities of *Heliophanus xerxesi* Logunov, 2009 in Iran. Type locality marked with red dot.

0.50 + 0.55 + 0.45 + 0.35); II 2.45 (0.80 + 0.40 + 0.50 + 0.45 + 0.30); III 3.00 (0.90 + 0.50 + 0.55 + 0.65 + 0.40); IV 3.85 (1.15 + 0.55 + 0.85 + 0.80 + 0.50). Leg spination: I: Fm d 1-1-1; Tb pr 0-1, v 2-0; Mt v 2-2 ap. II: Fm d 1-1-1; Tb pr 0-1, v 1-0; Mt v 2-2 ap. III: Fm d 1-1-2; Tb pr and rt 0-1, v 2 ap; Mt pr 2 ap, rt 2 ap, v 2 ap. IV: Fm d 1-1-1; Tb pr and rt 1-1, v 2 ap; Mt pr and rt 1-2 ap, v 1-0-2 ap. Coloration: Carapace dark brown, almost black, shiny, covered with sparse white scales (Fig. 11). Sternum dark brown (Fig. 12). Labium and endites brown, with pale apexes. Chelicerae dark brown. Clypeus and cheeks brown, covered with short white hairs. Abdomen brown ventrally, covered with white scales; dorsum dark brown, covered with white and iridescent scales (Fig. 11). Book-lung covers brown. Spinnerets dark brown. Palps yellow, covered with white hairs. Palpal coxa dark brown, palpal tibia covered with brown hairs. All legs yellow. Coxa IV dark brown retrolaterally. Fm I with four stridulatory hairs. Epigyne and spermathecae as in Figs 6-8: copulatory openings hidden under C-shaped epigynal wings (Fig. 6), spermathecae small, with two short accessory glands (Fig. 8).

Distribution: *Heliophanus xerxesi* is an Iranian endemic, known from Chaharmahal & Bakhtiari, Ilam, Isfahan, Markazi and Kerman provinces, western to

southeastern Iran (Fig. 13) (Logunov, 2009; Zamani *et al.*, under review; present data).

DISCUSSION

A total of 14 *Heliophanus* species (see Table 1) have been recorded from Iran (Zamani *et al.*, 2019). Two species, *H. cupreus* (Walckenaer, 1802) and *H. flavipes* (Hahn, 1832), are widely distributed in the Palaearctic, from Europe to the South Urals and central Siberia (Logunov & Marusik, 2001). The remaining species are confined to the territory of the “ancient Mediterranean” (*sensu* Kryzhanovsky, 2002), except for *H. edentulus* Simon, 1871 which was also reported from Nigeria (Wesołowska & Edwards, 2012). Two species, *H. iranus* Wesołowska, 1986 and *H. xerxesi*, seem to be endemic to Iran. However, *H. xerxesi*, which was described from southern Iran, has also been recorded from the northwestern part of the country (present data) and therefore its presence in neighbouring countries such as Azerbaijan, Armenia, Iraq and Turkey is possible. For five species, *H. decoratus* L. Koch, 1875, *H. edentulus*, *H. equester* L. Koch, 1867, *H. glaucus* Bösenberg & Lenz, 1895 and *H. verus* Wesołowska, 1986, the corresponding localities in Iran lie at the easternmost limit of their distribution (Logunov *et al.*, 2002; Logunov, 2010). *Heliophanus*

Table 1. Biogeographical data of *Heliophanus* species recorded from Iran. Distribution data are based on the World Spider Catalog (2019) and Logunov & Marusik (2001).

Species	Distribution	Type of range
<i>H. chovdensis</i> Prószyński, 1982	Iran, Kazakhstan, Mongolia	Central Asian subboreal range (Logunov & Marusik, 2001)
<i>H. cupreus</i> (Walckenaer, 1802)	Europe, North Africa, Turkey, Caucasus, Russia (to the South Urals), Iran, China	Palaearctic temperate range (Logunov & Marusik, 2001)
<i>H. curvidens</i> (O. P.-Cambridge, 1872)	Turkey, Israel to China	Near East - Mongolian subboreal range (Logunov & Marusik, 2001)
<i>H. decoratus</i> L. Koch, 1875	Mediterranean to Iran	Mediterranean - Near East subboreal range
<i>H. dunini</i> Rakov & Logunov, 1997	Turkey, Ukraine, Caucasus, Iran, Kazakhstan	East European - Middle Asian subboreal range
<i>H. edentulus</i> Simon, 1871	Mediterranean to Iran, Nigeria	West African - Near East subtropical range
<i>H. equester</i> C.L. Koch, 1867	Italy to Azerbaijan, Iran	Mediterranean - Near East subboreal range
<i>H. flavipes</i> (Hahn, 1832)	Europe, Turkey, Caucasus, Europe (to central Siberia), Iran, Central Asia, China	Trans-Palaearctic temperate range (Logunov & Marusik, 2001)
<i>H. forcipifer</i> Kulczyński, 1895	Central Asia, Iran	Cental Asian subboreal range
<i>H. glaucus</i> Bösenberg & Lenz, 1895	Egypt, Lybia, Iran	Near East subboreal range
<i>H. iranus</i> Wesołowska, 1986	Iran	Iranian endemic
<i>H. mordax</i> (O. P.-Cambridge, 1872)	Greece to Central Asia	Mediterranean - Central Asian subboreal range
<i>H. verus</i> Wesołowska, 1986	Turkey, Iran, Azerbaijan	Near East subboreal range
<i>H. xerxesi</i> Logunov, 2009	Iran	Iranian endemic

forcipifer has the southernmost limit of its distribution in Iran (Logunov *et al.*, 2002).

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On *Anchonidium* Bedel, 1884 sensu stricto, with descriptions of two new species from the Iberian peninsula (Coleoptera, Curculionidae: Molytinae)

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Abstract: Specimens attributed to the type species of the genus *Anchonidium* Bedel, 1884, *A. unguiculare* (Aubé, 1850) were re-examined. As a result *Anchonidium braunerti* sp. nov. from the southern Serra de Monchique, and *A. spathiferum* sp. nov. from mountain chains in northern Portugal (Serra da Estrela, Serra do Marão) are described. The revised distribution of *A. unguiculare* is mapped.

Keywords: Curculionidae - Molytinae - morphology - taxonomy - Portugal.

INTRODUCTION

It was Charles Nicolas Aubé (1850) who described *Styphlus unguicularis* based on specimens from France (“environs de Chinon, environs de Châteauroux”) and *Styphlus ulcerosus* based on specimens from Georgia (“aux environs de Batoum [= Batumi], en Iméritie”). Gustav Stierlin (1881) transferred *Styphlus ulcerosus* to the genus *Cotaster* Motschulsky, 1851 based on the (although weakly) separated procoxae and the strongly hooked tibiae. Fairmaire (1883) described *Styphlus rotundicolle* Fairmaire, 1883 from Morocco, seemingly with a smaller pronotum, which size is however rather variable in *Anchonidium unguiculare*. It was then Bedel (1884) who described the genus *Anchonidium* with its type species *Styphlus unguicularis* Aubé, 1850 and synonymised in the same footnote Fairmaire’s species *rotundicolle* with *unguicularis*. Faust (1886b) described with *Anchonidium perpensum* (from Muchet = Mccheta, Georgia) and *A. corticeum* (from Meskisches Gebirge = near Abastumani, Georgia), both from the Caucasus, another two species apparently close to *A. caucasicum* – where *A. corticeum* is in synonymy with the latter in the latest catalogue (Alonso-Zarazaga *et al.*, 2017). Faust only knew *Styphlus ulcerosus* from its description and included some words about the doubtful nature of this species in one of his articles (Faust, 1886a). He also transferred *S. ulcerosus* back to *Styphlus* Schoenherr, 1826, which was however not followed by subsequent authors. Reitter (1916) indirectly mentioned both, *A. unguiculare* (from France) and *A. caucasicum* (“Krain”) in his determination

keys, and Schaufuss (1916) listed *A. unguiculare* and *A. caucasicum* (as *ulcerosum* and *perpensum*) under the genus name *Anchonidium*, the same with Dalla Torre *et al.* (1932) and in the latest catalogue by Alonso-Zarazaga *et al.* (2017).

Other discoveries of superficially similar Molytinae from Africa, among them eight species assigned to *Anchonidium* were described by Hoffmann (1965, 1968) and Voss (1965, 1974) but actually do not belong to this genus (Grebennikov, 2018; Grebennikov, in prep.).

Finally Osella (1979, 1985) presented a possible sister-group of *Anchonidium* – at least from a morphological point of view – when describing the new genus *Pseudoanchonidium* Osella, 1979, represented with four species in the eastern Mediterranean. Just recently, Savitsky (2018) discovered that *Styphlus ulcerosus* is a junior synonym of *Orthochaetes caucasicus* Motschulsky, 1845, hence the combination had to be adapted to *Anchonidium caucasicum* (Motschulsky, 1845).

Regarding the tribal position of *Anchonidium*, and hence the placement at a higher systematic level, the original combination in the genus *Styphlus* assumed relationships with Eirrhinidae by Schoenherr (1826) (at present *Styphlus* is included in Curculioninae), changed by Lacordaire (1863) including *Styphlus* (and thus Aubé’s species *Styphlus unguicularis* and *ulcerosus*) within Rhytirrhini together among others with the European *Dichotrachelus* Stierlin, 1853 and *Orthochaetes* Germar, 1823. Reitter (1913) then proposed the tribe Plinthini within Curculioninae for *Anchonidium*. Dalla Torre

(1932) listed the genus in Hylobiinae, Anchonini. Later Alonso-Zarazaga & Lyal (1999) proposed a classification in Molytinae, Molytini in the subtribe Typoderina, at present upgraded by Alonso-Zarazaga *et al.* (2017) to a separate tribe Typoderini. In the Palaearctic realm, the tribe Typoderini comprises eight genera and its distribution ranges from the Canary Islands and the circum-Mediterranean region to China and Japan. Outside the Palaearctic, Africa harbours several additional genera (Alonso-Zarazaga & Lyal, 1999).

During two excursions to Portugal, to the Algarve in 2013, and the Sierra da Estrela massif in 2014, a number of specimens provisionally identified as *Anchonidium unguiculare* was collected. A more detailed examination allowed to distinguish three distinct morphotypes, two of which are here described as new species.

MATERIAL & METHODS

The specimens of the new species, as well as of *A. unguiculare*, were obtained using a usual beetle sifter (grid diameter 7 mm). The extraction method applied follows Germann (2014).

The following related species were also used for comparison:

- *Caulomorphus lederi* (Chevrolat, 1880): 6 individuals, Suram Pass, 1911, Kulzer, det. F. Zumpt, vid. G. Osella 1968 (cGF).
- *Caulomorphus wittmeri* Osella, 1976: 1 male, Iran, Mazanderan, Naharkoran, Gorgan, 36°44'N, 54°29'E, A. Senglet leg., 20.VII.[19]73, det. Osella [19]84 (MHNG). Holotype male Iran, Gole Lovae ["via Minoodasht", addition taken from Osella, 1976, not mentioned on the labels!], 750/1400 m, 3.5.1970, leg. Wittmer & v. Bothmer (NMB).
- *Anchonidium caucasicum* (Motschulsky, 1845): 1 male Kaukas [leg.] Leder (NHHM). 1 male Constantinopel [Istanbul], Adampol, 1900, [leg.] Korb (NHHM).
- *Pseudoanchonidium tauricum* Osella, 1979: 1 male paratype: Turchia, Urabat [environments of Kozan, Adana, addition taken from Osella, 1979], 6.V.1967 [leg.] C. Besuchet (MHNG).

Acronyms of collections and institutions:

- cCB collection Carlo Braunert, Mensdorf, Luxembourg
- cCG collection Christoph Germann, Switzerland, Rubigen
- cGA collection Gabriel Alziar, Cassagnes-Bégonhès, France
- cGF collection Georg Frey (in the NMB)
- cIW collection Ingo Wolf, Germany, Bad Endorf
- cJM collection Jochen Messutat, Germany, Preussisch-Oldendorf
- cJT collection José Luis Torres, Los Barrios, Spain

- cLB collection Lutz Behne (in the SDEI)
- cPH collection Peter Hlaváč, Prague, Czech Republic
- HNHM Hungarian Natural History Museum, Budapest
- MHNG Muséum d'Histoire Naturelle de la Ville de Genève
- NHML Natural History Museum London
- NMB Naturhistorisches Museum Basel
- NMBE Naturhistorisches Museum Bern
- NMPC National History Museum Prague, Czech Republic
- SDEI Senckenberg Deutsches Entomologisches Institut, Müncheberg

Additional data and remarks to the labels are set in rectangular brackets in the sections "Material examined." Body size is measured dorsally from fore margin of pronotum to the apex of elytra. Photos were taken by the author with a VHX-6000 photosystem by Keyence at the NMB. All type specimens are labelled with red printed name labels, and are labelled with a barcode unique specimen identifier.

RESULTS

Overview

Although recent efforts (Grebennikov, 2018) brought some light into the chaotic systematic situation within Molytidae, with main focus on the tribe Typoderini, the phylogenetic relationships within the informal "*Anchonidium*-group" after Zherichin (1987) are still far from being well understood. If any sister-taxa can be named for *Anchonidium*, then *Aparopion* (at present in the same tribe) might be a candidate due to its external morphology, the slender rostrum, antennae inserted towards tip. Bedel (1884) already used *Aparopion* for comparison when describing *Anchonidium* and used the small eyes, the missing tubercles on the elytra and the antennal segments for differentiation, where the second funicular segment is shorter than first one and all following ones are transverse. Although molecular data do not support a sister relationship (Grebennikov, 2014), and regarding genital morphology *Aparopion* is very deviating with a twisted, asymmetrical, and sharply pointed penis (see Zuppa & Osella, 1999), this argument, however can be flawed by the symmetrical penis of a morphologically close genus *Pseudoparopion* Borovec, Osella & Zuppa, 2002, also assigned by the authors to the informal "*Anchonidium*-group" (Borovec *et al.*, 2002). *Pseudoanchonidium* (Fig. 5B, E) is another, morphologically similar genus. Osella (1979) used the genital organs (hook-like bowed in lateral view; Fig. 3Q-R), and the funicular segments (more similar to *Aparopion* due to the first two antennomeres of the funicle subequal in length and the following antennomeres subquadrate) to legitimate an independent generic status. Unfortunately no freshly collected specimens suitable for

a genetic examination were available up to date. Finally *Caulomorphus* Faust, 1886 (Fig. 5A, D) – a genus with reduced eyes from the Caucasian region, Turkey and Iran – with a similar antennal funiculus with short second segment, and following antennomeres transverse and broadening, and a cup-shaped first club segment of the antenna, shows furthermore morphological similarities, despite of its present, rather surprising and erroneous position within the tribe Molytini, Plinthina. With the hereby redescribed *Anchonidium* based on the type species *A. unguiculare*, it becomes evident based on the morphological evidence summarized in the key below and shown on the plates, that the genus itself is likely to be paraphyletic with the three species of *Anchonidium* in narrow sense (*A. unguiculare*, *A. braunerti* sp. nov. and *A. spathiferum* sp. nov.) and the remaining valid species attributed to that genus in wider sense (e.g. *A. perpensum* and *A. caucasicum* Figs 3O-P; 4N-O; 5C-F). A through re-evaluation of this hypothesis is only possible with a comprehensive morphological matrix, ideally accompanied by genetic data. Hence in the present article, the focus is strictly on *Anchonidium* in a narrow sense and the description of new the species.

Genus *Anchonidium* Bedel, 1884

Rostrum with long and straight scrobes, these flattened and conjoint at underside towards base (Figs 1A-B). 2/3 of underside of rostrum from tip on bearded (Figs 1B, D, G), rather densely covered by longer yellowish bowed bristles, dorsum of rostrum flattened,

tricarinate (Fig. 1A), angulate towards apex and base (Fig. 1D). First club segment several times longer than following ones, cup-shaped; antennal funiculus with 7 antennomeres, longest first segment, second one half of the length and following ones transverse, steady broadened towards club (Fig. 1I). Pronotum roundish, characteristically sculptured with a V-shaped impression on upper side, and a longitudinal carina at disc, strongly constricted before fore margin, strongly punctuate (Fig. 1F); Procoxae almost touching each other, separated by thin interspace (Fig. 1C); Mesocoxae separated by half their diameter; hind margin of metasternum with sharp pointed edges sideways (Fig. 1E). Metacoxae separated by 1.5 their diameter; in middle of metacoxae on first ventrite coarsely punctuate with especially large, roundish-oval punctures or confluent huge punctures in the shape of an oval groove (Fig. 1J); elytra with striae coarsely punctuate, intervals reduced to narrow elevated ridges between stria, uneven intervals higher elevated (Fig. 2D-F); vestiture of body and legs dominated by yellowish bowed bristles, these denser standing along sides and underside of rostrum, on pronotum, on femora and tibiae, and along uneven ridges on elytra; Femora unarmed; Tibiae all uncinat at outer angle (Fig. 1H), third tarsal segment bilobed, claws simple, free; genital organs: penis tube shaped in cross-section and bowed in lateral view (Figs 3I-L), bursal atrium strongly sclerotized (Fig. 4J, K).

Remark: One of the most apparent differences between the three species of *Anchonidium* in the narrow sense and the others, is the very deviating shape of the penis

Diagnostic key to species of the genus *Anchonidium*

- 1A Body without yellowish bowed bristles only sparse setae on elytra; elytra oval, laterally evenly rounded; pronotum without sculpturation, evenly rounded at disc; penis flat in cross section, characteristically cut in middle at apex (Fig. 3O-P), species from Caucasian region..... ***Anchonidium sensu lato***
- 1B Body with yellowish bowed bristles, dense on rostrum, pronotum, along ridges on elytra, and on legs; elytra laterally more parallel; pronotum strongly sculptured (Fig. 1F); penis tube-shaped in cross section, apex rounded, blunt or sinuate (Figs 3A-L), species from western Europe and northern Africa ***Anchonidium sensu stricto*, 2**
- 2A Ventral side of pronotum at fore margin with a faint and shallow rostral notch or channel (Fig. 1C). First ventrite with oval groove between metacoxae (Fig. 1J); elytra laterally rounded, shorter, 1.4-1.5 times as long as wide; 10 to 12 punctures on elytral disc from base to declivity; widest in first third (Fig. 2D-F); penis thin (lateral view), slender with almost rectangular apex and rounded sides (dorsal/ventral view; Fig. 3I-L). Great Britain (Cornwall), W- and NW-France, N-, NW- and S-Spain, N-Portugal, N-Morocco ***A. unguiculare***
- 2B Ventral side of pronotum at fore margin only sinuate, no rostral notch or channel detectable (Fig. 2B). First ventrite without groove (Fig. 2B), but very coarse and/or oval punctures between metacoxae; elytra parallel sided, longer, 1.5-1.8 times as long as wide; 14 to 16 punctures on elytral disc from base to declivity, widest in or behind middle (Fig. 2A, C); penis short, blunt and thick in lateral view (Figs 3A-H)..... **3**
- 3A Elytra widest along middle (Fig. 2A), 1.6-1.8 times as long as wide; tip of penis broad, margin rounded (Fig. 3E-H). Portugal (Serra de Monchique) ***A. braunerti* sp. nov.**
- 3B Elytra widest behind middle (Fig. 2C), 1.5-1.6 times as long as wide; tip of penis very broad, spatula-shaped with sinuate fore margin (Fig. 3A-D). Portugal (Serra da Estrela, Serra do Marão)..... ***A. spathiferum* sp. nov.**

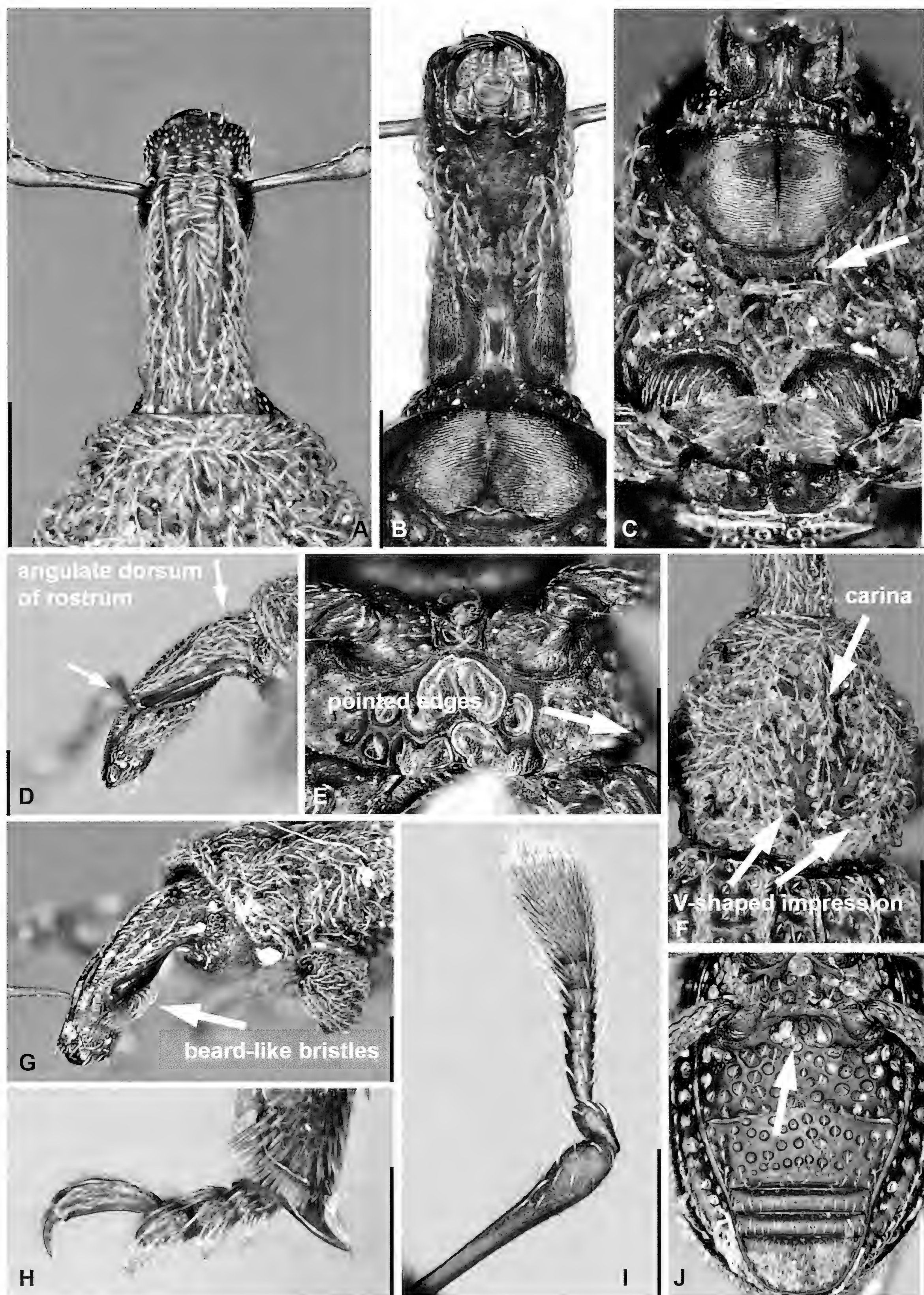


Fig. 1. *Anchonidium unguiculare*, morphological details. Scale bars 0.25 mm. (A) Dorsum of rostrum. (B) Underside rostrum with beard like bristles and conjoint antennal grooves. (C) Ventral view on pronotum with faint and shallow rostral notch and narrow standing procoxae. (D) Lateral view on rostrum. (E) Mesocoxae and mesosternal process. (F) Pronotum surface. (G) Dorso-frontal view on head and pronotum. (H) Right protarsus and apex of protibia. (I) Right antenna with bowl shaped club.

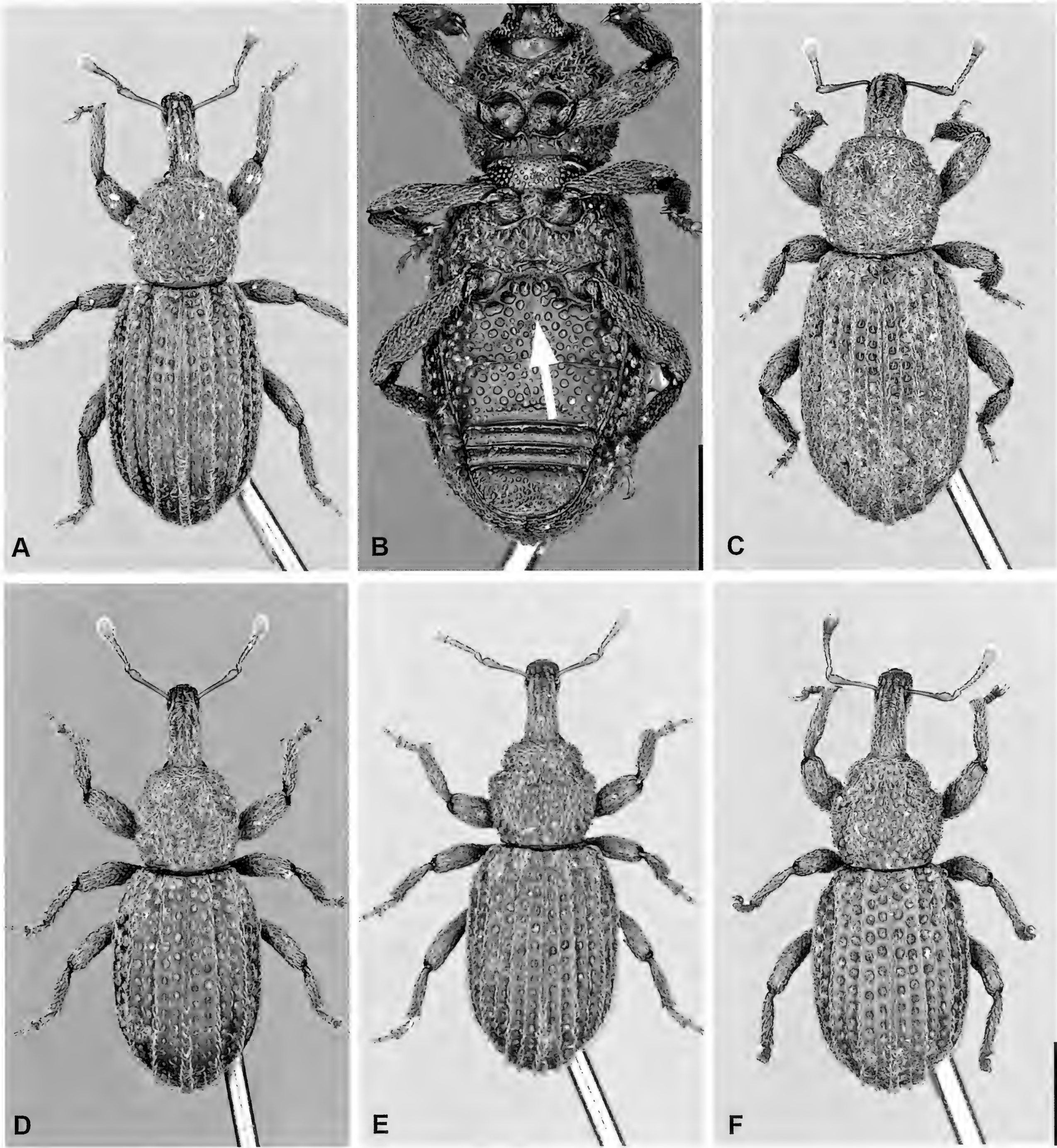


Fig. 2. Habitus of *Anchonidium* spp. Scale bars 1 mm. (A) *A. braunerti* sp. nov., Portugal, Serra do Estrela, male. (B) *A. spathiferum* sp. nov., ventral side; the arrow indicates missing groove between metacoxae in comparison with *A. unguiculare*. (C) *A. spathiferum* sp. nov., Portugal, Serra de Monchique. (D) *A. unguiculare*, Spain, Cadiz. E. ditto Spain, Alto Campoo. (F) *A. unguiculare*, Great Britain, Cornwall.

of *A. caucasicum*, which is flat in cross-section (and not tube shaped as in *Anchonidium* sensu stricto) with its tip cut in middle (Fig. 3O-P).

Remarks: As both new species of the genus *Anchonidium* are – based on their external morphology – very similar to each other and share in general most characters with *A. unguiculare*, except for those ones mentioned in the key below, the descriptions of the new species are provided in a condensed form.

***Anchonidium unguiculare* (Aubé, 1850)**

Figs 1A-J; 2D-F; 3I-L; 4F, H, J-K; 6.

Material examined

France

2 ex.; St. Martin, Landes; coll. G.A.K. Marshall (NHML). – 1 ♂; Morlaix; leg. R. Hervé, coll. G. Frey (NMB). – 1 ex.; Gallia, La Ferta [La Fertais]; coll. Frivaldsky (HNHM). – 2 ♀; Morlaix; leg. E. Hervé (NMB). – 2 ex.; Sos, Bauduer [roundish yellow and green labels] (MHNG). – 1 ex.; Gallia; leg. Merkl, coll. Reitter (HNHM). – 1 ex.; Gallia mer. [meridionale]; coll. Reitter (HNHM). – 1 ex.; Sos; coll. Reitter (HNHM). – 1 ex.; Gallia; coll. Reitter (HNHM). – 1 ex.; Blain, Loire-Inf.; Revelière, coll. Cn. Tournier (MHNG). – 1 ex.; Sos; Bauduer, coll. Cn. Tournier (MHNG). – 1 ex.; Bordeaux; leg. G. Tempère, coll. V. Kodrić (MHNG). – 3 ex.; Beg-Meil, 09.1903; coll. Odier (NHML). – 3 ex.; Huelgoat, Finistère, 10.1904; coll. Odier (NHML). – 1 ♂; env. de Bordeaux, 04.05.1908; coll. A. Mathey (NMBE). – 1 ♀; Bordeaux, 04.05.1908; coll. A. Mathey (NMBE). – 1 ex.; Tresses, Env. de Bordeaux, 3.[19]36; leg. G. Tempère, coll. V. Kodrić (MHNG). – 1 ex.; Cambes, Gironde, 09.04. [19]37; leg. E. Giraud, coll. H. Perrot in coll. M. Curti (MHNG). – 1 ex.; Cave Oloron, B.P. 17.07.[19]48; coll. J. Ochs (MHNG). – 1 ex.; Oxybar [cave close to Camou Cihique] B. P. X.[19]48; coll. J. Ochs (MHNG). – 1 ex.; Ronceraux [Roncesvalles], Pyr. Occ. Esp., 26.04.[19]74; (MHNG). – 1 ex.; Licq-Athéray, Bass. Pyr., 20.09.197; leg. M. Curti (MHNG). – 1 ex.; Bager d'Olozon, Oloron, B. Pyr., 21.09.1979; leg. M. Curti (MHNG). – 1 ex.; Bénéjacq, Bass. Pyr., 23.09.1979; leg. M. Curti (MHNG). – 1 ex.; Corvèze, Donzence, N Brive, 08.09.1984; leg. J. Martens (cLB). – 1 ex.; Corrèze, Beynat, 400 m, 13.-31.07.1992; leg. Schawaller (cLB). – 1 ex.; Hossegor, Landes, 23.07.1993; (cJM). – 3 ex.; Cassagnes-Bégonhès, ravin de la Barthette, 500 m, 03.10.2016, tamisage de mousse dans un bois de feuillus; leg. G. Alziar (cGA). – 10 ex.; Cassagnes-Bégonhès, ravin de la Barthette, 570 m, 04.10.2017, tamisage de mousses dans un bois de feuillus divers; leg. G. Alziar (cGA). – 1 ex.; Cassagnes-Bégonhès, au-dessus du Céor, bois 550 m, 18.11.2018, sous les Festuca; leg. G. Alziar (cGA). – 5 ♂, 3 ♀; Brittany, Ille-et Vilaine depart., 1.5 km E St.-Coulomb, 3 km W Cancale, wood along rivulet, N48°40'23"

W1°53'22", 34 m, 25.08.2015; leg. C. Braunert // sifting (cCB). – 1 ♀; Brittany, Ille-et Vilaine depart., 3.5 km NW St.-Coulomb., 3 km NE Rothéneuf Pointe du Meinga, 48°42'6"N, 1°56'12"W, 34 m, 27.08.2015, shore cliff; leg. C. Braunert // Sifting (cCB). – 1 ♀; Brittany, Ille-et Vilaine depart., 1.5 km N St.-Coulomb, 4.5 km NW Cancale Anse Margot, 48°41'25"N, 1°54'26"W, 2 m, shore, cliff; leg. C. Braunert // Sifting (cCB). – 3 ex.; Cassagnes-Bégonhès, ravin de la Barthette, 500 m, 03.10.2016, tamisage de mousse dans un bois de feuillus; leg. G. Alziar (cGA). – 10 ex.; Cassagnes-Bégonhès, ravin de la Barthette, 570 m, 04.10.2017, tamisage de mousses dans un bois de feuillus divers; leg. G. Alziar (cGA). – 1 ex.; Cassagnes-Bégonhès, au-dessus du Céor, bois 550 m, 18.11.2018, sous les Festuca; leg. G. Alziar (cGA).

Great Britain

Apparently only known from a single locality, namely Gweek in the extreme south-west of the island (comm. Max Barclay): 4 ♂, 3 ♀; W. Cornwall, Gweek, SW 708260, 10.8.2008; leg. R.G. Booth // Winkler bag extraction of woodland litter (cCG, NHML).

Spain

1 ex.; Caboalles, leg. Paganetti, coll. J. Fodor (NHHM). – 1 ex.; Caboalles; leg. Paganetti (NHHM). – 1 ♂; Sierra de Moncayo; leg. H. Franz (NHMP). – 1 ♂, 3 ex.; Monte Aa b. Ruente, Prov. Santander; leg. H. Franz (NHMP). – 2 ♂, 2 ♀; Manzanal; leg. Paganetti, coll. G. Frey (NMB). – 6 ♂, 1 ♀; Ponferrada; leg. Paganetti, coll. G. Frey (NMB). – 1 ♂; Branuelas; leg. Paganetti, coll. G. Frey (NMB). – 2 ♂; Algesiras [Algeciras] Andal.; leg. Breit, coll. G. Frey (NMB). – 2 ♂, 1 ♀, 7 ex.; Caboalles; leg. Paganetti (HNHM). – 1 ♂; Ponferrada; leg. Paganetti (HNHM). – 1 ♀; Cancas Ast[uria]; leg. Paganetti (NMB). – 1 ♀; Algesiras [=Algeciras], Andal.[= Andalusia]; leg. Breit (NMB). – 2 ♀; Ponferrada; leg. Paganetti (NMB). – 7 ex.; Ponferrada; leg. Paganetti (NHMP). – 27 ex.; Ponferrada; leg. Paganetti (SDEI). – 2 ex.; Ponferrada; coll. Künnemann (SDEI). – 6 ex.; Cancas Ast[uria]; leg. Paganetti (SDEI). – 2 ex.; Ponferrada; leg. Paganetti, coll. J. Ochs (MHNG). – 4 ex.; Ponferrada (Paganetti); Coll. Perrot (MHNG). – 40 ex.; Ponferrada; leg. Paganetti (HNHM). – 5 ex.; Cancas Ast. [Asturias]; leg. Paganetti, coll. J. Fodor (HNHM). – 2 ex.; Cancas Ast. [Asturias]; leg. Paganetti (NHHM). – 1 ex.; Asturien [Asturias]; Getschmann 1879, coll. Reitter (NHHM). – 3 ♂; W-Pyrenäen, Mte Alzo, B. Tolosa, 14.03.1951; leg. H. Franz, coll. G. Frey (NMB). – 1 ♂; Villafurfe de Carriedo, Santander, 13.07.[19]54; leg. S.V. Paris (cLB). – 1 ex.; Coruña, dint., Sobrado Montes, Laguna, 15.6.1989, 500 m; leg. M. Meregalli (NHML). – 1 ex.; Oviedo, Sierra Navaliego, 400 m, Rio Cerezal, 20.06.1989; leg. M. Meregalli (NHML). – 1 ex.; Coruña, dint., Carballo, 400 m, Silva, 15.06.1989; leg. M. Meregalli (NHML). – 1 ex.; Santander, P. to S.

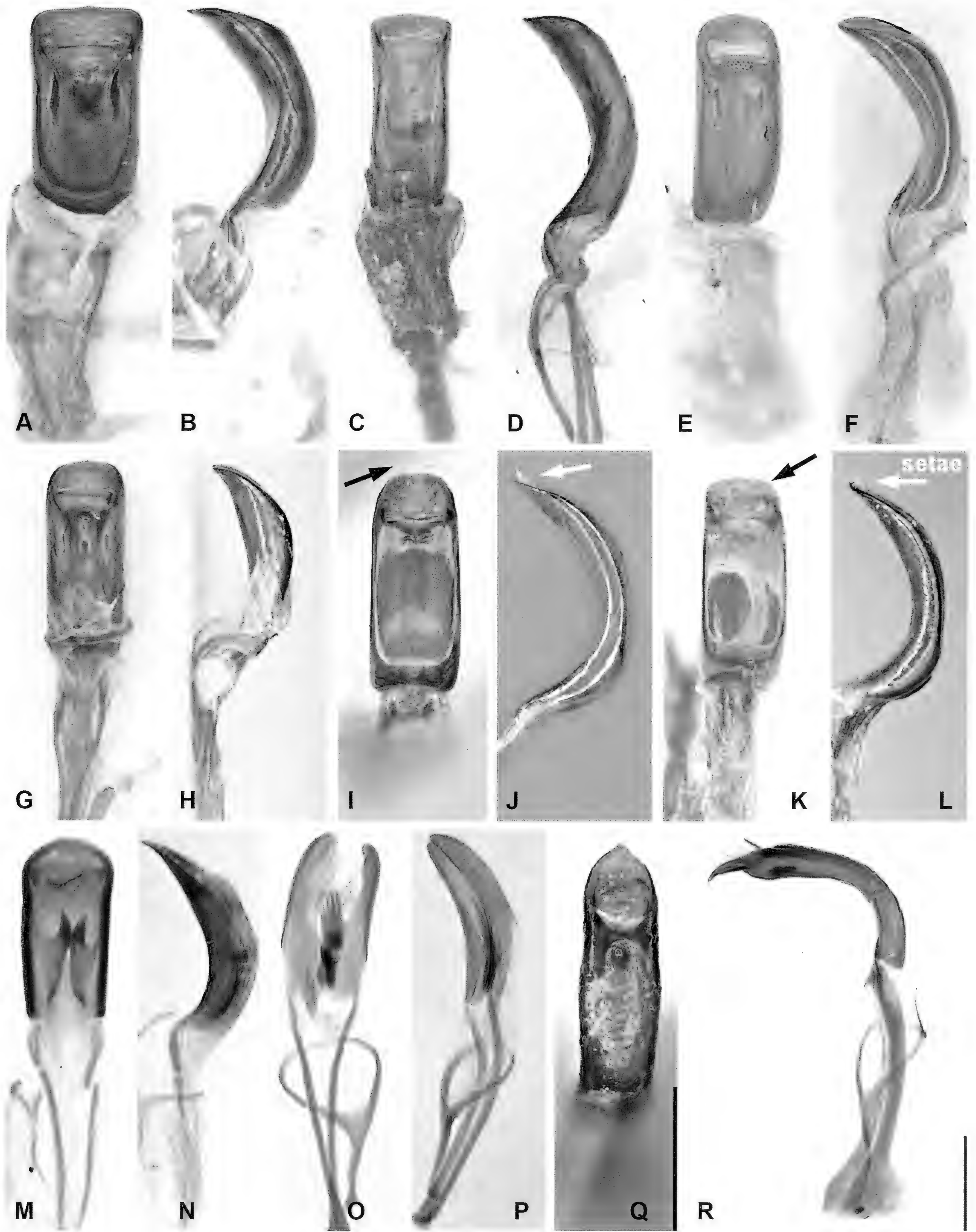


Fig. 3. Male genitalia of *Anchonidium* and similar genera (dorsal and lateral view). Scale bars 0.25 mm. (A-B) *A. spathiferum* sp. nov., Serra da Estrela. (C-D) *A. spathiferum* sp. nov., Serra do Marão. (E-F) *A. braunerti* sp. nov., Serra de Monchique. (G-H) *A. braunerti* sp. nov., Serra de Monchique. (I-J) *A. unguiculare*, Morocco Sebta. (K-L) *A. unguiculare*, Spain, Pontevedra. (M-N) *Caulomorpha wittmeri*. (O-P) *Anchonidium caucasicum*. (Q-R) *Pseudoanchonidium tauricum*.

Glorio vers. N., 1200 m, 22.06.1989; leg. M. Meregalli (NHML). – 1 ♂, 1 ex.; Santander, Cab. de la Sal, Rio Bayones, 350 m, 24.06.1989; leg. M. Meregalli (NHML). – 2 ex.; Pontevedra, 4 km S Moscoso, Frenza, 14.06.1989, 400 m; leg. M. Meregalli (NHML). – 1 ex.; Pontevedra, Caldas R., Cequeril, 350 m, 14.06.1989; leg. M. Meregalli (NHML). – 2 ex.; Lugo, Pontenovo, Vilaboa, 400 m, 17.06.1989; leg. M. Meregalli (NHML). – 1 ♀; Oviedo, Sierra de Bobla-Bres, 500 m, 16.06.1989; leg. M. Meregalli (NHML). – 2 ex.; Oviedo, Tineo, 5 km N Pola de Allande, 800 m, 16.06.19; leg. M. Meregalli (NHML). – 2 ♂, 19 ex.; Cantabria, Alto Campoo, W Reinoso, 04.06.[19]91, 1400 m, Eichenwald [sifting]; leg. L. Zerche (cLB). – 1 ♂; Oviedo, Tuiza, Strasse zum Puerto de Cubilla, 1400 m, 08.06.[19]91, Spritzmoos; leg. L. Zerche (cLB). – 1 ex.; Vitoria, Sra de Cantabria, 850 m, 12.06.1991; leg. M. Meregalli (NHML). – 1 ex.; Monforte, Sta Peña Reconde, Parada das Montes, 06.06.1991; leg. M. Meregalli (NHML). – 2 ex.; Vitoria, Mt. de Olivarri, 05.07.1993; leg. M. Meregalli (NHML). – 1 ex.; Bilbao, Rio Ceberio, 05.07.1993; leg. M. Meregalli (NHML). – 18 ex.; Cádiz, Andalusien, ca. 10 km W Los Barrios, Gesiebe unter Korkeichen, 210 m, 36°11' N 5°34' W, 10.02.1999; leg. L. Zerche (cLB, SDEI). – 2 ♂; Andalusien, Cádiz, Canuto Garganta del Medio, 15 km NO Alcalá de los Gazules, Bachufer, Streu von *Rhododendron ponticum*, 450 m, 36°32'N, 5°38'W, 02.02.1999; leg. L. Zerche (cLB, SDEI). – 2 ♀; Galicia, Edreida, 18 km NE Viana do Bolo, Sierra do Eixe, 1200 m, 05.08.2002, 42°16'33 N, 6°55'31" W, Ginster auf Fels [sifting]; leg. C. Germann (cCG). – 2 ♂, 2 ♀; Cádiz, Los Barrios, 10.11.2009; leg. J. L. Torres // cribando en el suelo (cCG, cJT). – 2 ♂, 1 ♀; Cádiz, Los Barrios, 10.04.2012; leg. J. L. Torres // cribando bajo *Quercus canariensis* (cCG, cJT). – 1 ♂; Sta Marina, 43.494°N, 8.047°W, 15.04.2013; leg. T. Struyve (CPH). – 1 ♂; Galicia, Pontevedra prov., Uma, 42.159°N, 8.421°W, 19.05.2013; leg. T. Struyve (CPH).

Portugal:

1 ♀; Serra do Gerés, Portelo do Leonte/Portelo do Homem, 10.06.1997; leg. Th. Aßmann (cLB). – 13 ex.; Minho, Covas, Caminha, 02.-17.10.[19]99; leg. J. Messutat (cJM). – 1 ♂; Minho, Covas, Caminha, 02.-17.10.[19]99; leg. J. Messutat (cLB). – 3 ex.; Minho, Covas, Caminha, 05.06.[20]03; leg. J. Messutat (cJM).

Morocco:

1 ex.; 7 km S Essaouira, 24.12.2000; leg. J. Messutat (cJM). – 2 ♂, 5 ♀; 10 km W Sebta, 3 km N Benzou, *Q. suber*, Steineiche, *Pistacia*, 330 m, N35°53'06" W5°24'06", 25.12.2001; leg. C. Germann (cCG). – 2 ♀; Rif Mountains, 10 km W Ketama (=Issaguen), 1600 m, Zedern, Laurus [sifting], 34°57'40" N, 4°40'51" W, 26.12.2001; leg. C. Germann (cCG). – 1 ♂; Jbel Tazzeka, 20 km SW Taza, 1650 m, Eiche, N34°04'15", W4°10'50", 05.01.2002; leg. C. Germann (cCG). – 1 ♂, 1 ♀; Chefchauen, Rif Mts., Tleta-des-Beni-Ydar-Cheki, 15 km SW Zinat, 570 m, mixed oak forest, leaf litter sifted, 14.03.2003; leg. D.W. Wrase (cIW). – 7 ex.; S Ksar-es-Seghir, 278 m, N35°45'16" W 05°30'49", *Pistacia*, *Quercus suber*, 09.05.2009; leg. L. Behne (cLB, SDEI). – 19 ex.; W Sebta, vir. Birez, 337 m, N35°53'04" W05°24'08", *Quercus suber*, *Smilax*, *Arbutus*, 09.05.2009; leg. L. Behne (cLB, SDEI).

Redescription

Size: 2.2-3.6 mm. Body color auburn. Head hidden in pronotum, eyes oval, flat and small, comprising six to eight ommatidia, eyes lateral of rostral base, below middle of rostral diameter (Fig. 1G). Rostrum constricted at base, about 3.5 times longer than wide at level of insertion of antennae (Fig. 1A), parallel sided along basal 2/3 in dorsal view, widened from antennal insertion to tip, buckled downwards at basal constriction in lateral view (Fig. 1D), ventral side straight to tip, dorsal side weakly bowed. Dorsum of rostrum tricarinate in basal half, middle carina diverging behind antennal insertion, and converging before, thus opening a spindle-shaped groove. Sides of rostrum coarsely punctuate, tip of rostrum glabrous and with fine punctuation. Vestiture consisting of yellowish recumbent bristles, these standing in rows on dorsum of rostrum (Fig. 1A), pointing towards spindle-shaped groove along carinae, longer recumbent bristles beard-like below lower edge of antennal scrobes (Figs 1B, G). Antennal insertion behind last fourth of rostral length, scrobes lateral, straight pointing to lower margin of eye (Fig. 1D), reaching ventral side of rostrum (Fig. 1B).

Antennae with scape a bit longer than one third of rostrum, parallel sided from base to last third, from there on culled. Antennal funiculus with 7 segments,

Fig. 4. Female genitalia, scale bars 0.25 mm.

A. spathiferum sp. nov., Serra da Estrela: (A) Ventricle VIII. (D) Spermatheca. (G) Gonocoxite of ovipositor. (L-M) Sclerotized bursal atrium (dorso-ventral and lateral view).

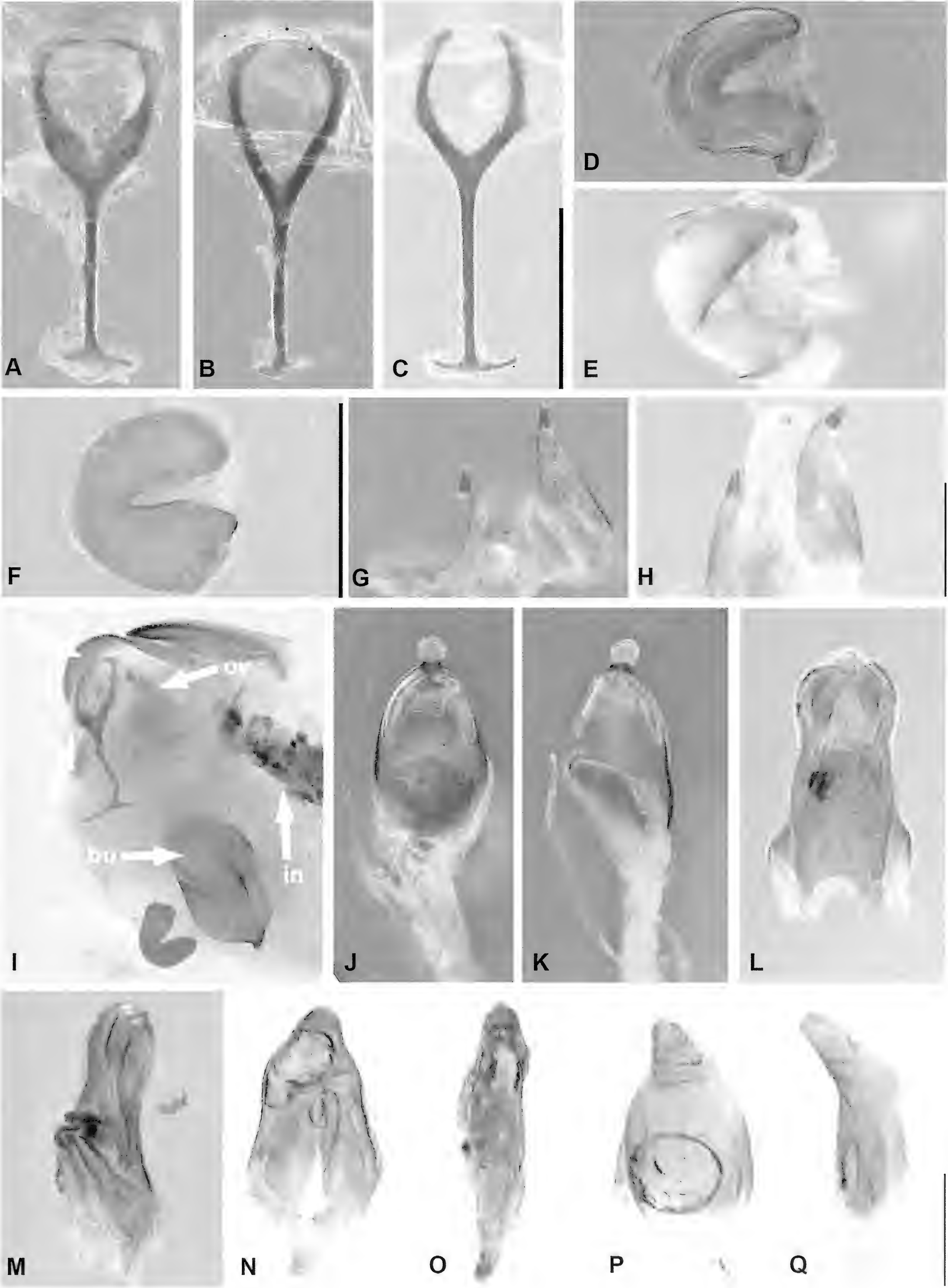
A. braunerti sp. nov., Serra do Monchique: (B) Ventricle VIII. (E) Partly broken spermatheca. (ovipositor and bursal atrium are missing).

A. unguiculare, France, St.-Coulomb: (C) Ventricle VIII. (F) Spermatheca. (H) Gonocoxite of ovipositor. (J-K) Sclerotized bursal atrium (dorso-ventral and lateral view)

A. spathiferum sp. nov.: (I) Dissected female genitalia. Abbreviations: te = tergite VIII; ve = ventrite VIII; ov = ovipositor; in = intesticals; bu = strongly sclerotized bursal atrium; sp = spermatheca.

A. caucasicum: (N-O) Sclerotized bursal atrium.

Caulomorphus lederi: (P-Q) Sclerotized bursal atrium.



first one twice as long as wide, second 1.5 longer than wide, following ones wider than long, steady broadened towards club (Fig. 1I). Club with jar-shaped first segment (Fig. 1I), as long as last four funicular segments together, following two hardly visible ones short and flat, club densely covered with whitish hairs.

Pronotum L/W: 1.0-1.1 times about as long as wide, roundish, strongly constricted behind fore margin, only weakly at hind margin, with V-shaped impression on upper side, and a longitudinal carina, which ends before hind margin in a deep impression (Fig. 1F). Pronotum densely and coarsely punctuate, vestiture consisting of

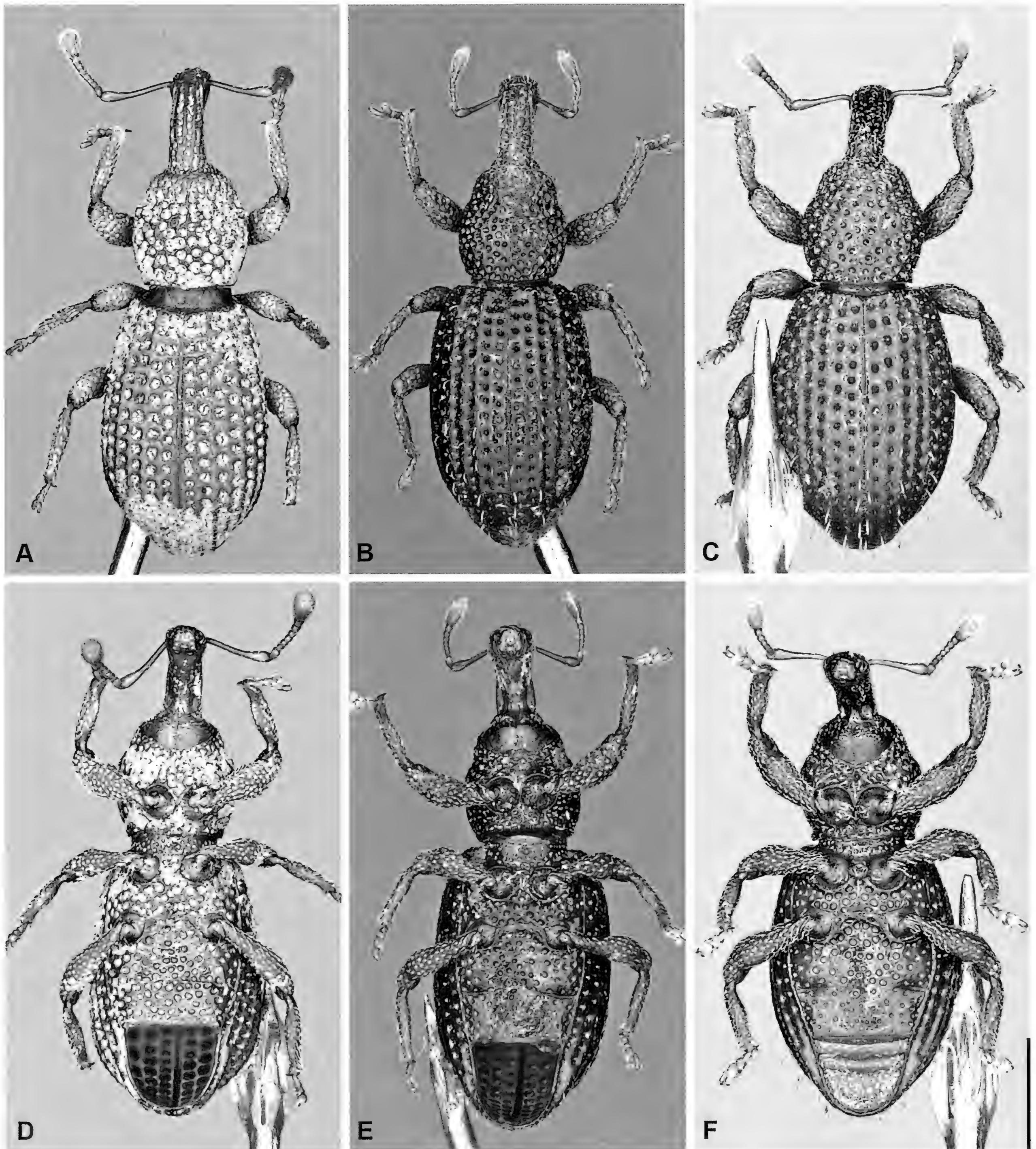


Fig 5. Morphologically similar genera compared with *Anchonidium* based on external morphology, dorsal and ventral views. Scale bar 1 mm. (A, D) *Caulomorphus wittmeri* Osella, 1976. (B, E) *Pseudoanchonidium tauricum*. (C, F) *Anchonidium caucasicum*.

yellowish recumbent bristles. Scutellum hardly visible, punctiform. Ventral side at fore margin with a faint and shallow rostral notch or channel. Procoxae close to each other, separated by a thin interspace (Fig. 1C). Mesocoxae separated by half their diameter, mesosternal process trapezoid (Fig. 1E), coarsely punctuate; Metacoxae separated from mesocoxae by hardly their diameter, and twice their diameter between themselves (Fig. 1J); length of metasternum hardly as long as diameter of mesocoxae or as long as two of the coarse punctures in line; in middle on first ventrite with roundish-oval groove due to confluent 2 or 3 huge punctures (Fig. 1J).

Elytra L/W: 1.4-1.5, elongate, parallel sided, widest in middle, no humeral calli, apterous (Figs 2D-F). 10 striae very coarsely and regularly punctuate, counting 10-12 punctures from elytral base to declivity, intervals narrow, elevated in shape of prominent ridges, uneven ones higher elevated and somewhat wider. Vestiture with same bristles as pronotum and rostrum, bristles in one row on even intervals and 2-3 irregular rows on uneven ones.

Ventral side abdomen (Fig. 1J): Five glabrous ventrites, first and second ones fused but separated by a suture fainted in middle; first and second ventrites coarsely

punctuate with sparse yellowish appressed hairs, directed backwards; following two similarly narrow, with one row of bowed hairs, last ventrite finely punctuate with more dense standing appressed yellowish hairs.

Legs: unarmed, strong, set with yellowish appressed hairs; tibiae with a fringe of orange stiff spines at apex; inner angle of tibiae with strong uncus directing inwards (Fig. 1H), tibiae with three subsequent strong tarsomeres, third one bilobed, fourth minute, narrow, claw segment narrow, longer than second and third combined, claws free.

Genitals, male: penis tube shaped, dorso-ventrally flattened, bowed in lateral view, apex blunt in dorso-ventral view, almost rectangular or conical with rounded sides, in lateral view apex pointed, apex at dorsal side, just before weakly sclerotized window, with fringe of several straight appressed setae (Figs 3I-L).

Female: ventrite VIII (or spiculum ventrale) with rhomboidal plate, feebly sclerotized in middle (Fig. 4C), apodeme 1.5 the length of plate with anchor-shaped apex. Spermatheca c-shaped with broad and rounded cornu, base bottle shaped with hardly noticeable ramus and nodulus (Fig. 4F). Gonocoxite of ovipositor triangular,

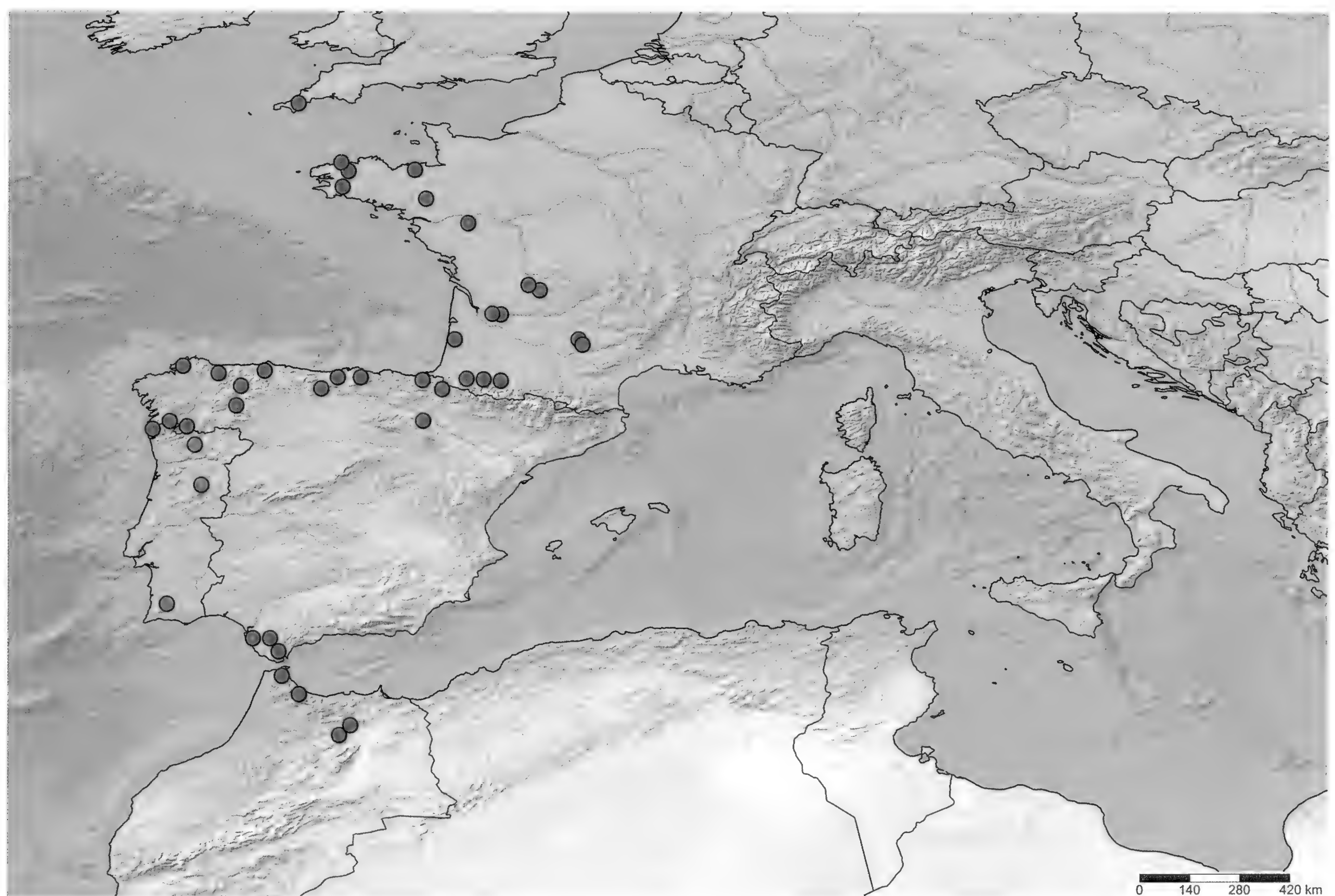


Fig. 6. Map of all localities where specimens of the genus *Anchonidium* were examined within this present contribution. Blue circles: *Anchonidium unguiculare*; green circle: *A. braunerti* sp. nov.; red circles: *A. spathiferum* sp. nov. (base layer created with <https://www.simplemappr.net>).

weakly sclerotized, styli pointed (Fig. 4H). Bursal atrium remarkably strong sclerotized (Figs 4J-K), cab-shaped with small bubble at apex.

Anchonidium braunerti sp. nov.
Figs 2A, 3E-H, 4B, E, 6.

Material examined

Holotype: ♂; NMB-COLEO0009759; Portugal, Algarve, Poia Granitberg Gipfel Serra de Monchique, 37°18'58"N,

8°35'39"W, 890 m, 10.04.2013; leg. C. Braunert // Sifting (NMB).

Paratypes: 3 ♂, 1 ♀; Portugal, Algarve, Poia Granitberg Gipfel Serra de Monchique, 37°18'58"N, 8°35'39"W, 890 m, 10.04.2013; leg. C. Braunert // Sifting (cCB). – 1 ♂; Portugal, Monchique, Fóia, N37°18'58", W8°35'39", 890 m, 10.4.2013; leg. C. Germann (cCG).

Diagnosis: Size: 2.8-3.0 mm. Body colour auburn. Pronotum: Underside at fore margin without rostral notch or channel, only somewhat sinuate. Metacoxae separated



Fig. 7. Typical habitat aspects of *Anchonidium* spp. (A) *A. unguiculare*, Bretagne, St-Coulomb (photo C. Braunert). (B) *A. braunerti* sp. nov., Portugal Serra de Monchique, Foia. (C) *A. spathiferum* sp. nov., Portugal, Serra da Estrela (photos C. Germann).

from mesocoxae by their diameter and about a quarter more; length of metasternum well as long as diameter of mesocoxae or as long as three of the coarse punctures in line; in middle of metacoxae on first ventrite coarsely punctuate with especially large, roundish-oval punctures, but not confluent in the shape of a groove.

Elytra L/W: 1.66-1.80, elongate, parallel sided, widest in middle (Fig. 2C). Striae coarsely and regularly punctuate, counting 14-16 punctures from elytral base to declivity.

Male genitalia: Penis narrow, oblong oval, regularly rounded at apex in dorsal-ventral view (Fig. 3E-H), in lateral view bowed, apex blunt. Female genitalia (4B-E): ventrite VIII with plate drop-shaped, apodeme as long as plate, apex thickened and laterally weakly protruding. Spermatheca c-shaped with tip of cornu attenuated, base roundish, ramus and nodulus hardly noticeable (back part of spermatheca is missing). Gonocoxite of ovipositor and bursal atrium are lost.

Derivation of name: Dedicated to its discoverer, dear friend and estimated excursionist Carlo Braunert (Luxembourg) to honour his tireless and enthusiastic passion for weevils.

Anchonidium spathiferum sp. nov.

Figs 2B-C, 3A-D, 4A, D, G, L-M; 6.

Material examined

Holotype: ♂; NMB-COLEO0009800; Portugal, Beira Baixa, Sierra do Estrela, E Penhas da Saude, Vale das Cortes, 1290 m, 40°17'36"N, 7°32'14"W, 22.04.2014; leg. C. Germann (NMB).

Paratypes: 1 ♀; Portugal, Beira Baixa, Sierra do Estrela, E Penhas da Saude, Vale das Cortes, 1290 m, 40°17'36"N, 7°32'14"W, 22.04.2014; leg. C. Germann (cCG). – 4 ♂, 1 ♀; Portugal, Beira Baixa, Sierra do Estrela, E Penhas da Saude, Vale das Cortes, Macchie/Garrigue [sifting], 1290 m, 40°17'36"N, 7°32'14"W, 22.04.2014; leg. C. Braunert (cCG, cCB).

Examined non-type specimens: 1 ♀; Portugal, Vila Real, Serra do Marão, 750 m, 21.05.1997; leg. W. Starke (cLB). – 1 ♂, 1 ♀; Portugal, Vila Real, Serra do Marão, 750 m, June 1997; leg. Th. Aßmann (cLB). – 1 ♂; Portugal, Vila Real, Serra do Marão, 750 m, 10.06.1997; (SDEI).

Diagnosis: Size: 3.2-3.9 mm. Body colour auburn.

Pronotum: Underside at fore margin without rostral notch or channel, just somewhat sinuate. Metacoxae separated from mesocoxae by their diameter and about a quarter more; length of metasternum well as long as diameter of mesocoxae or as long as three of the coarse punctures in line; in middle of metacoxae on first ventrite coarsely punctuate with especially large, roundish-oval punctures (Fig. 2B), but not confluent in the shape of a groove.

Elytra L/W 1.57-1.62, elongate, parallel sided, widest behind middle (Fig. 2C). Striae coarsely and regularly punctuate, counting 14-16 punctures from elytral base to declivity.

Male genitalia: Penis rectangular, parallel sided, broadened, enlarged sideways and margin sinuate at apex with small tip in the middle in dorsal-ventral view, in lateral view apex pointed, abruptly narrowed (Figs 3A-D). Female genitalia: ventrite VIII with plate inverted bell-shaped with forked branches thickened, apodeme as long as plate, apex inverted T-shaped (Fig. 4A). Spermatheca c-shaped, cornu attenuate towards rounded tip, base with globular ramus and hardly noticeable nodulus (Fig. 4D). Gonocoxite of ovipositor triangular, weakly sclerotized with parallel sided, tube shaped styli (Fig. 4G). Bursal atrium strongly sclerotized, frog body-shaped in dorso-ventral view (Fig. 4L-M).

Derivation of name: The epithet “*spathiferum*” characterises the shape of the penis: “spatula” from Greek “σπάθη” and “fer” wearing.

Remarks: The specimens from the species’ population on Serra do Marão differ slightly from the typical ones from Serra da Estrela (see slightly narrower penis in Fig. 3C-D), therefore they are not included in the type series. More specimens are needed to evaluate the significance of these differences.

DISCUSSION

Within Portugal the new species described here show a very restricted distribution (Fig. 6) and may thus have evolved very locally in the higher elevated, mountainous regions: *Anchonidium braunerti* sp. nov. in the south on Monchique, and *A. spathiferum* sp. nov. up in the northern mountains (Serra da Estrela, Serra do Marão). As a hypothesis, the ancestor of the present day species of *Anchonidium* may have been spread over the whole Iberian peninsula, or at least along the whole coastal line, and maybe due to unfavorable conditions (e.g. dry periods without growing humid forests or wet heathland, which seem to be typical and a precondition for the presence of *Anchonidium*; Figs 7A-C), had to go back north- or/and northeastwards again, or stayed at higher elevated mountain refugia in the case of *A. braunerti* sp. nov. and *A. spathiferum* sp. nov. where humidity and heathland provided constant habitat preconditions. This scenario must have occurred several times, as there are no detectable morphological differences between populations of *A. unguiculare* from Great Britain, France, Spain and northern Africa. It is furthermore interesting that no specimens of *A. unguiculare* could be found within the area in Portugal where *A. braunerti* sp. nov. and *A. spathiferum* occur, especially along the coast line; however this could still be explained due to inadequate collection efforts.

The remarkably strong sclerotized bursal atrium in *Anchonidium* (but also present in *Caulomorphus* (Fig. 4P-Q), and *Aparopion* (not shown) based on the recent characterisation and explanation by Cristóvão

& Lyal (2018) for Anchonini, can also be stated for the investigated Typoderini. In the case of *Anchonidium unguiculare* and *A. spathiferum* sp. nov., the bursal atrium can be used for discrimination. Due to the loss of the structure, this remains to be tested for *A. braunerti* sp. nov.

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Checklist of the nematode parasites of wild birds of Argentina

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Abstract: A commented checklist of the nematodes parasites of Argentinean wild birds is presented. This is the first compilation of parasitological papers about nematodes of Argentinean birds published between 1873 and November 2019. This review includes information about 64 nematode nominal species and 13 taxa identified at generic level, belonging to five orders, 16 superfamilies, 20 families, and 44 genera. Five species were considered *incertae sedis*, because they were described based only on larval stages, and one species was maintained as species *inquirenda*. The highest number of taxa of nematodes was recorded in the family Acuariidae with 20 nominal species and two taxa identified at generic level, followed by Anisakidae with eight nominal species and one taxon identified at generic level, and Tetrameridae with eight nominal species and two taxa identified at generic level. Of the 1042 species of birds reported in Argentina, only 65 (6.24%) were reported as hosts of adult nematodes. The families of birds with the highest number of reported taxa were Tinamidae (12 nematode taxa), Laridae (11), Anatidae (8) and Phalacrocoracidae (7). The present review provides data on hosts, geographical distribution, sites of infection, location of material deposited in Helminthological Collections, references, and taxonomic comments. A host/parasite list is also provided.

Keywords: Aves - Helminths - Nematoda.

INTRODUCTION

Argentina possesses a high diversity of birds with 1033 native species and 9 introduced (Roesler & González Táboas, 2016). Nematodes are an important group of parasites in birds and their taxonomy, phylogeny, zoogeography, and ecology still requires study (Zhang *et al.*, 2012). Particularly, in Argentina the literature on the nematode parasites of birds is scattered and the studies have focused mainly on taxonomy. The first reports of nematodes parasitizing Argentinean birds was carried out by the English parasitologist, Thomas Spencer Cobbold, who studied filariae found by Charles Darwin parasitizing the greater rhea from Bahía Blanca, Buenos Aires Province during his travel through South America between 1831 and 1836 (Cobbold, 1873, 1886). The next contribution was made by a German naturalist established in Argentina, Carlos Berg, who reported filariae in an egg of greater rhea (Berg, 1896). The next report was also carried out by a foreign scientist, Corrado Parona, who described some species of helminths from fishes, birds and mammals from material that was sent to him by

Carlos Berg for identification, among them, five species of nematodes from wild birds were reported (Parona, 1900). Between 1918 and 1928, several works on microfilariae found in bloodstream of wild birds were published by local scientists, among the most outstanding works are the publications of the physician and bacteriologist Salvador Mazza, who was the main researcher working on Chagas-Mazza disease in Argentina (Biglieri, 1918; Mazza *et al.*, 1927; Mazza & Franke, 1928). Between 1943 and 1975, fifteen papers were published on Nematoda of wild birds. Most of them were carried out by the veterinarians Juan José Boero and Jorge Eugenio Led (Boero & Led, 1968, 1971; Boero *et al.*, 1968; Boero *et al.*, 1972a, b). In this period the publications made by the European biologist Jacobus H. Schuurmans Stekhoven – who studied the nematodes of wild vertebrates of Argentina, Chile, and Paraguay during his stay in Argentina in the 50s – are particularly remarkable. He published an extensive work in which he described seven new species of nematodes parasitizing birds from northern Argentina and nine new geographical records (Schuurmans Stekhoven, 1951). During the following 20 years (1976-1995) only one

contribution was published (Zeiss & Seigmur, 1981). From 1996, the number of publications carried out by Argentinean scientists increased, published by several groups of parasitologists mostly from the University of La Plata (Buenos Aires Province) and Puerto Madryn (Chubut Province) and mainly dedicated to nematodes of birds related to aquatic environments.

The aim of this paper was to compile and summarize all the published reports about adult nematodes of wild birds from Argentina based on original records.

MATERIALS AND METHODS

This checklist was prepared on the basis of data published from 1873 to November 2019. Species reported in theses, dissertations, and scientific meetings were not listed because they represent informal publications. However, two proceedings of scientific meetings are mentioned in the comments, given that some species were originally described in these proceedings and were subsequently considered valid by other authors in formal publications. For the construction of this list only wild birds were included, domestic birds were not taken into account. Each taxonomic category of Nematoda is presented in alphabetical order. Each record contains information on the species or generic name, taxonomic authority, host(s), site of infection (SI), localities (Lo) (particular locality, Province and geographical coordinates when reported in the original paper were converted to WGS 84 decimal degrees), number of lots and collection acronym when material was deposited, and bibliographical references (numbers in superscript refer to the corresponding reference). The classification for nematodes follows the Keys to the Nematode Parasite of Vertebrates of Anderson *et al.* (2009) and Gibbons (2010), except for *Tetrameres* and *Microtetrameres* (Tetrameridae) which are considered as separate genera. The taxonomy of birds follows AVIBASE (Lepage, 2019), where also the taxonomic authorities of the bird taxa can be found. Acronyms used for the Biological Collections are: CHIOC (Coleção Helmintológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brazil); CH-N-FML (Colección Helmintológica de la Fundación Miguel Lillo, Tucumán Province, Argentina); CNP-Par (Collection of the Centro Nacional Patagónico, Puerto Madryn, Argentina); IPCAS Helm. Coll (Helminthological Collection of the Institute of Parasitology, Biology Centre of the Czech Academy of Sciences, České Budějovice, Czech Republic); MLP-He, sometimes as CHMLP in the original papers (Colección Helmintológica del Museo de La Plata, Buenos Aires Province, Argentina); USNM (United States National Museum, National Museum of Natural History, Washington, U.S.A.), also cited with a previous acronym USNPC (United States National Parasite Collection); NHMUK (The Natural History Museum, London, U.K.), sometimes as BMNH (British Museum of Natural History) in the original papers; MNHN (Muséum

National d'Histoire Naturelle, Nematodes collection, Paris, France); MACN-pa (colección de parasitología, Museo Argentino de Ciencias Naturales "Bernadino Rivadavia", Buenos Aires, Argentina).

RESULTS

At present, 71 papers have been published on some aspects of nematodes infecting Argentinean wild birds – most of them are related to taxonomic aspects, distribution, and host-parasite associations – while a few dealt with the pathological effects caused by nematodes in birds. The checklist from the available literature on nematodes parasites of wild birds in Argentina comprises records on 64 nematode nominal species and 13 taxa identified at generic level, belonging to five orders, 16 superfamilies, 20 families and 44 genera associated with 13 species of Pelecaniformes; eight species of Charadriiformes and Passeriformes; six species of Strigiformes; five species of Anseriformes; four species of Tinamiformes; three species of Falconiformes, Podicipediformes and Psittaciformes; two species of Accipitriformes, Piciformes, Rheiformes and Sphenisciformes; and one species of Coraciiformes, Gruiformes, Phoenicopteriformes and Procellariiformes.

Parasite-Host List

Phylum Nematoda

Class Adenophorea

Order Enoplida

Superfamily Dioctophymatoidea

Family Dioctophymidae

Genus *Eustrongylides* Jägerskiöld, 1909

Eustrongylides tubifex (Nitzsch in Rudolphi, 1819)

Host: *Podiceps major*. **SI:** proventriculus. **Lo:** Moreno Lake (-41.0667, -71.55), Río Negro Province. **Reference:** Brugni & Viozzi (2003).

Superfamily Trichinelloidea

Family Trichuridae

Genus *Capillaria* Zeder, 1800

Capillaria sp.

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** San Carlos de Bariloche (-41.05, -75.4167), Río Negro Province. **Reference:** Kreiter & Semenas (1997).

Host: *Nothura maculosa nigroguttata*. **SI:** not reported. **Lo:** Buenos Aires Province. **Reference:** Boero *et al.* (1968).

Genus *Eucoleus* Dujardin, 1845

Eucoleus penidoi (Freitas & Almeida, 1935)

Host: *Nothura maculosa*. **SI:** muscular stomach. **Lo:** Maipú, Buenos Aires Province. **Reference:** Kaseta

(1973). **Comment:** cited as *Capillaria penidoi* Freitas & Almeida, 1935. The genus *Eucoleus* was considered synonymous of *Capillaria* by Anderson *et al.* (2009), although both genera are so far considered valid (Moravec, 2001; Gibbons, 2010).

***Eucoleus* sp.**

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** Chubut Province. **Reference:** Díaz *et al.* (2011a). **Comment:** immature adult specimens.

Genus *Ornithocapillaria* Baruš & Sergeeva, 1990
***Ornithocapillaria ovopunctata* (Linstow, 1873)**

Host: *Sturnus vulgaris*. **SI:** intestine. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6736. **Reference:** Valente *et al.* (2014).

Genus *Pterothominx* Freitas, 1959
***Pterothominx exilis* (Dujardin, 1845)**

Host: *Sturnus vulgaris*. **SI:** intestine. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6735. **Reference:** Valente *et al.* (2014).

Class Secernentea
Order Ascaridida
Superfamily Ascaridoidea
Family Anisakidae

Genus *Contracaecum* Railliet & Henry, 1912
***Contracaecum australe* Garbin *et al.*, 2011**

Host: *Phalacrocorax brasilianus*. **SI:** stomach. **Lo:** Piedras Moras Reservoir (-32.1667, -64.2833), urban Lake Villa Dalcázar (-33.1; -64.36667), Pampean Lagoon (-34.7667, -63.6333) and Río Cuarto (-33.1167, -64.3) Córdoba Province. **References:** Biolé *et al.* (2012). **Comment:** adults and third and fourth stage larvae.

Host: *Phalacrocorax gaimardi*. **SI:** stomach. **Lo:** Isla del Rey (-47.7667, -66.05), Cañadón del Puerto (-47.75, -66) and Isla Elena (-47.75, -65.9333), Puerto Deseado, Santa Cruz Province. **Material deposited:** MLP–He 6758. **Reference:** Garbin *et al.* (2014). **Comment:** adults and third and fourth stage larvae.

***Contracaecum chubutensis* Garbin, Díaz,
Cremonte & Navone, 2008**

Host: *Phalacrocorax atriceps*. **SI:** stomach. **Lo:** Bahía Bustamante (-45.1833, -66.50)^{1, 2} and Puerto Madryn (-42.7833, -65.0333)¹, Chubut Province. **Material**

deposited: MLP–He 5748, 5749, 5750¹. **References:** Garbin *et al.* (2008¹, 2011²).

***Contracaecum microcephalum* (Rudolphi, 1809)**

Host: *Ardea alba egretta* (cited as *Casmerodius albus egretta*). **SI:** esophagus, stomach and small intestine. **Lo:** Leales, Tucumán Province¹; La Plata Zoological Garden, Buenos Aires Province². **Material deposited:** CH–N–FML 1817¹. **References:** Schuurmans Stekhoven (1951)¹; Boero *et al.* (1972a)².

Host: *Ardea cocoi*. **SI:** esophagus, stomach and small intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero *et al.* (1972a).

Host: *Nycticorax nycticorax*. **SI:** esophagus, stomach and small intestine. **Lo:** Uribelarrea¹ and La Plata Zoological Garden, La Plata², Buenos Aires Province. **References:** Boero & Led (1971)¹; Boero *et al.* (1972a)².

***Contracaecum mirounga* Nikolskiy, 1974**

Host: *Spheniscus magellanicus*. **SI:** proventriculus. **Lo:** Península Valdés (-42.0667 to -42.8833, -63.63 to -64.50), Chubut Province. **Material deposited:** MLP–He 7464. **Reference:** Garbin *et al.* (2019a).

***Contracaecum multipapillatum* (Drasche, 1882)**

Hosts: *Ardea alba* Linnaeus¹; *Ardea alba egretta* (cited as *Egretta alba egretta*)². **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833)¹ and Mar Chiquita coastal Lagoon (-37.7667, -57.45)², Buenos Aires Province. **Material deposited:** MACN–pa 385²; MLP–He 4598¹. **References:** Labriola & Suriano (1996)²; Navone *et al.* (2000)¹.

Host: *Bubulcus ibis ibis*. **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 385. **Reference:** Labriola & Suriano (1996).

Host: *Egretta thula thula*. **SI:** esophagus and stomach. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 385. **Reference:** Labriola & Suriano (1996). **Comment:** Labriola & Suriano (1996) described *Contracaecum philomultipapillatum*, later this species was synonymized with *C. multipapillatum* by Navone *et al.* (2000).

***Contracaecum ovale* (Linstow, 1907)**

Host: *Rollandia rolland*. **SI:** stomach. **Lo:** Mar Chiquita Lagoon (-37.7667, -57.45) and Chascomús Lagoon

(-35.6667, -58.00), Buenos Aires Province. **Material deposited:** MLP–He 6313. **Reference:** Galeano & Tanzola (2012).

Contracaecum pelagicum
(Johnston & Mawson, 1942)

Host: *Eudyptes chrysocome* (cited as *E. cretatus*). **SI:** intestine. **Lo:** not reported. **Reference:** Boero *et al.* (1972b). **Comment:** cited as *Contracaecum spheniscus* Boero & Led, 1970.

Host: *Spheniscus magellanicus*^{1, 2, 3}. **SI:** intestine¹, stomach^{2, 3}. **Lo:** not reported¹, Península Valdés (-42.06667 to -42.8833, -63.63 to -64.5), Chubut Province^{2, 3}; and Mar del Plata (-38.0833, -57.6333), Buenos Aires Province². **Material deposited:** MLP–He 5591^{2, 3}. **References:** Boero *et al.* (1972b)¹; Garbin *et al.* (2007)²; Díaz *et al.* (2010)³. **Comment:** cited as *C. spheniscus* by Boero *et al.* (1972b).

Host: *Thalassarche melanophris* (cited as *Diomedea m.*). **SI:** stomach. **Lo:** Península Valdés (-42.0667 to -42.88333, -63.633 to -64.50), Chubut Province. **Material deposited:** MLP–He 5591. **Reference:** Garbin *et al.* (2007).

Comment: *Contracaecum spheniscus* was described in the proceedings of a congress in 1970, based only on male specimen found in the proventriculus of *S. magellanicus* from the La Plata Zoological Garden. Boero *et al.* (1972b) considered it valid, and reported males and females parasitizing penguins. Finally, Garbin *et al.* (2019a) synonymized *C. spheniscus* with *C. pelagicum*.

***Contracaecum travassosi* Gutiérrez, 1943**

Host: *Phalacrocorax albiventer*. **SI:** stomach. **Lo:** San José lighthouse, Chubut Province. **Material deposited:** CHIOC (number not provided). **Reference:** Gutiérrez (1943).

***Contracaecum* sp.**

Host: *Fulica leucoptera*. **SI:** intestine. **Lo:** Trelew, Chubut Province. **Reference:** Parona (1900). **Comment:** Cited by Parona (1900) as *Ascaris spiculigera* Rudolphi, 1809. There is much confusion in the literature about the many species of *Contracaecum*. Hartwich (1964) revised this genus and presented a list of synonyms. Among them, considered *Contracaecum spiculigera* (Rudolphi, 1809) and *A. spiculigera* synonymous of *C. microcephalum*. Also, he studied other specimens identified by Rudolphi (1809) as *A. spiculigera*, but considered these specimens as members of *Contracaecum rudolphii* Hartwich, 1964.

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** San Carlos de Bariloche (-43.05, -75.4167), Río Negro Province¹; Chubut Province². **References:** Kreiter & Semenas (1997)¹; Díaz *et al.* (2011a)². **Comment:** immature adult specimens².

Host: *Phalacrocorax albiventer*. **SI:** recovered from pellets. **Lo:** Punta León Reserve (-43.0778, -64.4958), Chubut Province. **Reference:** Malacalza *et al.* (1988).

Host: *Phalacrocorax atriceps*. **SI:** recovered from pellets. **Lo:** Punta León Reserve (-43.0778, -64.4958), Chubut Province. **Reference:** Garbin *et al.* (2019b). **Comment:** third and fourth stage larvae and adults specimens.

Host: *Phalacrocorax brasiliensis* (cited as *Phalacrocorax olivaceus olivaceus*). **SI:** proventriculus. **Lo:** Río de La Plata¹ (unspecified Province); and Los Quiroga dam, Santiago del Estero Province². **References:** Szidat & Nani (1951)¹; Zeiss & Seigmur (1981)². **Comment:** cited as *Contracaecum spiculigerum* (see previous taxonomic comment).

Host: *Phalacrocorax gaimardi*. **SI:** recovered from pellets. **Lo:** Isla Elena (-47.75, -65.9333), Ría Deseado, Santa Cruz Province. **Comment:** third and fourth stage larvae and adults specimens. **Reference:** Garbin *et al.* (2019b).

Host: *Spheniscus magellanicus*. **SI:** proventriculus. **Lo:** Río de la Plata (-35.4333 to -41.0333; -57.1167 to -62.8), Buenos Aires Province. **Material deposited:** MLP–He 7465. **Reference:** Garbin *et al.* (2019a).

Family Ascarididae

Genus *Porrocaecum* Railliet & Henry, 1912

***Porrocaecum heteropterum* (Diesing, 1851)**

Host: *Plegadis chihi*. **SI:** intestine. **Lo:** Guaminí (-37.00, -62.4833), Buenos Aires Province. **Material deposited:** MLP–He 4307/4 and NHMUK 1999.2.5.1–2. **Reference:** Digiani & Sutton (2001).

Host: *Theristicus melanopis* (Gmelin) (cited as *Theristicus melanopis melanopis*). **SI:** intestine. **Lo:** Rahue (-39.35, -70.9167), Neuquén Province. **Material deposited:** MLP–He 4599/1, 4600/1. **Reference:** Digiani & Sutton (2001).

Superfamily Heterakoidea

Family Ascaridiidae

Genus *Ascaridia* Dujardin, 1845

***Ascaridia hermaphrodita* (Frölich, 1789)**

Host: *Ara chloropterus*. **SI:** small intestine. **Lo:** San Cosme Department, Corrientes Province. **Reference:** Martínez *et al.* (2003).

Host: *Pionus maximiliani* siy. **SI:** small intestine. **Lo:**

San Antonio, Misiones Province. **Material deposited:** CH–N–FML 259. **Reference:** Schuurmans Stekhoven (1951).

Ascaridia sp.

Host: *Nothura maculosa annectens*. **SI:** small intestine. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Family Heterakidae
Genus *Heterakis* Schrank, 1790
Heterakis sp.

Host: *Nothura darwinii darwinii*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

**Genus *Odontoterakis* Skrjabin
& Schikhobalova, 1947**
Odontoterakis valvata (Schneider, 1866)

Host: *Crypturellus tataupa*. **SI:** intestinal caeca. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Nothura maculosa*¹; *Nothura maculosa nigroguttata*². **SI:** intestinal caeca. **Lo:** Maipú, Magdalena, Tandil and Rauch, Buenos Aires Province¹; and Buenos Aires Province². **References:** Kaseta (1973)¹; Boero *et al.* (1968)².

Comment: cited as *Heterakis valvata* Schneider, 1866, this species was synonymized with *O. valvata* by Inglis (1991).

Superfamily Seuratoidea
Family Seuratidae
Genus *Skrjabinura* Gnedina, 1933
Skrjabinura sp.

Host: *Megascops choliba*. **SI:** intestine. **Lo:** La Marcela farm (-26.2931, -59.1439), Pirané, Formosa Province. **Material deposited:** MLP–He 7247. **Reference:** Drago *et al.* (2015).

Superfamily Subuluroidea
Family Subuluridae
Genus *Oxynema* Linstow, 1899
Oxynema sp.

Host: *Oreopholus ruficollis*. **SI:** intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Genus *Subulura* Molin, 1860a
Subulura olympioi Barreto, 1918

Host: *Nothura maculosa*. **SI:** duodenum. **Lo:** Maipú, Magdalena, Coronel Dorrego and Rauch, Buenos Aires Province. **Reference:** Kaseta (1973).

Subulura strongylina (Rudolphi, 1819)

Host: *Crypturellus tataupa*. **SI:** intestine. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Subulura sp.

Hosts: *Nothura darwinii darwinii*; *Nothura darwinii salvadorii*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** caecum. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Order Oxyurida
Superfamily Oxyuroidea
Family Heteroxynematidae

Genus *Eudromoxyura* Anderson & Prestwood, 1972
Eudromoxyura aspiculuris (Boero & Led, 1971)

Hosts: *Eudromia elegans*¹; *Eudromia elegans albida*²; *Eudromia elegans elegans*^{1, 2}; *Eudromia elegans wetmorei* (cited as *Eudromia elegans morenoi*)³. **SI:** caecum^{1, 2}. **Lo:** Buenos Aires Province¹; La Pampa, San Juan and Mendoza Provinces²; General Acha, La Pampa Province³. **Material deposited:** MLP–He 1621 D¹; MNHN kh–443¹, sb–559¹; USNM 1358790, 1358791, 1358792 (cited as USNPC 63080, 63081, 63082)². **References:** Boero & Led (1971)³; Anderson & Prestwood (1972)²; Hugot *et al.* (1991)¹. **Comment:** Boero & Led (1971) described *Syphaciella aspiculuris* from *E. e. wetmorei*. Anderson & Prestwood (1972) described *Eudromoxyura elonbyrdi* from *E. e. elegans* and *E. e. albida*. Later, Hugot *et al.* (1991) studied these specimens and synonymized both species with *E. aspiculuris*.

Order Spirurida
Superfamily Acuarioidea
Family Acuariidae

Genus *Ancyracanthopsis* Diesing, 1861a
Ancyracanthopsis winegardi Wong & Anderson, 1990

Host: *Larus dominicanus*. **SI:** gizzard. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Material deposited:** MLP–He 4552. **Reference:** Cremonte *et al.* (2000).

Genus *Cosmocephalus* Molin, 1858a
***Cosmocephalus obvelatus* (Creplin, 1825)**

Host: *Larus dominicanus*. **SI:** esophagus. **Lo:** Chubut Province. **Material deposited:** MLP–He 4811-1 (cited as 4811) and CNP–Par 17. **Reference:** Díaz *et al.* (2011a).

Host: *Spheniscus magellanicus*. **SI:** esophagus. **Lo:** Península (-42.0667 to -42.8833, -63.633 to -64.5), Chubut Province. **Material deposited:** MLP–He 4811. **References:** Díaz *et al.* (2001, 2010).

Genus *Desportesius* Chabaud & Campana, 1949
***Desportesius longevaginatus* (Molin, 1860b)**

Host: *Ciconia maguari*. **SI:** esophagus. **Lo:** not reported. **Reference:** Boero *et al.* (1972b). **Comment:** cited as *Synhimantus longevaginatus* (Molin, 1860b), and later this species was synonymized with *D. longevaginatus* by Wong *et al.* (1986).

Genus *Echinuria* Soloviev, 1912
***Echinuria cygni* Morini, Colombo & Martin, 1959**

Host: *Cygnus melancoryphus*. **SI:** proventriculus². **Lo:** Buenos Aires Zoological Garden, Buenos Aires city¹; La Plata Zoological Garden, Buenos Aires Province². **References:** Rodríguez & Boero (1964)¹; Boero & Led (1968)². **Comment:** the females of this species were originally described by Morini, Colombo & Martín in the proceedings of a meeting “*Actas y Trabajos del primer congreso Sudamericano de Zoología*” in 1959. Rodríguez & Boero (1964) and Boero & Led (1968) consider it a valid species, and described the males.

***Echinuria skrjabiniensis* Efimov in Skrjabin, Sobolev & Ivashkin, 1965**

Host: *Calidris bairdii*. **SI:** proventriculus. **Lo:** Estancia María Cristina (-43.55, -70.6333), Sarmiento (-45.5833, -69.1167) and Estancia Quicahua (-42.45, -71.2167), Chubut Province. **Material deposited:** MLP–He 6346. **Reference:** Díaz *et al.* (2011b).

Host: *Calidris fuscicollis*. **SI:** proventriculus. **Lo:** Caleta Valdés (-42.50, -63.4167), Bahía Bustamante (-54.10, -66.5167) and Laguna del Ornitólogo (-43.2333, -65.2333), Chubut Province. **Material deposited:** MLP–He 6347. **Reference:** Díaz *et al.* (2011b).

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** Epecuén Lake (-37.2167, -62.85), Buenos Aires Province. **Material deposited:** MLP–He 7258. **Reference:** Núñez *et al.* (2017).

***Echinuria uncinata* (Rudolphi, 1819)**

Host: *Lophonetta specularioides*. **SI:** lumen of proventriculus. **Lo:** San Jorge Gulf (-45.0333; -65.8667), Chubut Province. **Material deposited:** MLP–He 7021 and CNP–Par (number not provided). **Reference:** Agüero *et al.* (2015).

Host: *Netta peposaca*. **SI:** proximal esophagus, almost at the junction with the proventriculus, within granulomas. **Lo:** Alvear (-29.1536, -56.9094), Corrientes Province. **Material deposited:** CHIOC 36627, 36628. **Reference:** Silveira *et al.* (2006).

Genus *Ingliseria* Gibson, 1968
***Ingliseria cirrohamata* (Linstow, 1888)**

Host: *Phalacrocorax atriceps* [cited as *P. (atriceps) albiventer*]. **SI:** esophagus. **Lo:** Patagonian Gulves (-42.0667 to -42.8833, -63.35 to -65.0667), Chubut Province. **Material deposited:** MLP–He 5863. **Reference:** Díaz *et al.* (2009).

Host: *Phalacrocorax brasilianus*. **SI:** esophagus. **Lo:** Patagonian Gulves (-42.0667 to -42.8833, -63.35 to -65.0667), Chubut Province. **Material deposited:** MLP–He 5864. **Reference:** Díaz *et al.* (2009).

Genus *Paracuaria* Rao, 1951
***Paracuaria adunca* (Creplin, 1846)**

Host: *Larus dominicanus*. **SI:** under the koilin at the junction of the proventriculus and gizzard¹ and esophagus². **Lo:** Puerto Madryn (-42.7833, -65.0333) and Fracasso Beach (-42.4167, -64.1167), Chubut Province¹; Chubut Province². **Material deposited:** MLP–He 5282^{1,2}; CNP–Par 18². **References:** Díaz *et al.* (2004¹, 2011a²).

Genus *Pectinospirura* Wehr, 1933
***Pectinospirura argentata* Wehr, 1933**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Bahía Blanca estuary¹ and Isla del Puerto (-38.80, -62.25)², Buenos Aires Province. **Material deposited:** MLP–He 5896¹. **References:** La Sala *et al.* (2009¹, 2012²).

Host: *Larus dominicanus*. **SI:** proventriculus. **Lo:** Balneario Orense (-38.70, -59.7833)¹ and Mar del Plata (-38.0833, -57.6333)², Buenos Aires Province. **Material deposited:** MLP–He 4064 (cited as 40,064)¹. **References:** Cremonte & Navone (1999)¹; Labriola & Suriano (2001)².

Genus *Sciadiocara* Skrjabin, 1916a***Sciadiocara haematopodi* Cremonte, Navone & Etchegoin, 1999**

Host: *Haematopus palliatus*. **SI:** gizzard. **Lo:** Mar Chiquita coastal lagoon (-37.7667, -57.45), Buenos Aires Province. **Material deposited:** MLP–He 4066/1, 4066/2, 4066/3 (cited as 40,066/1, 40,066/2, 40,066/3). **Reference:** Cremonte *et al.* (1999).

Host: *Larus dominicanus*. **SI:** gizzard. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Reference:** Cremonte *et al.* (1999).

Comment: Cremonte *et al.* (2000) reported third and fourth stage larvae of this species parasitizing *Larus dominicanus* from Mar Chiquita coastal Lagoon.

***Sciadiocara legendrei* (Petter, 1967)**

Host: *Tachyeres leucocephalus*. **SI:** gizzard. **Lo:** San Jorge Gulf (-45.0333; -65.8667), Chubut Province. **Material deposited:** MLP–He 7023 and CNP–Par (number not provided). **Reference:** Agüero *et al.* (2015).

***Sciadiocara* sp.**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Isla del Puerto (-38.80, -62.25), Bahía Blanca estuary, Buenos Aires Province. **Material deposited:** MLP–He 5898. **References:** La Sala *et al.* (2009, 2012).

Genus *Skrjabinoclava* Sobolev, 1943***Skrjabinoclava andersoni* Cremonte & Navone, 1999**

Host: *Larus atlanticus*. **SI:** proventriculus. **Lo:** Isla del Puerto (-38.80, -62.25), Bahía Blanca estuary, Buenos Aires Province. **Material deposited:** MLP–He 5897. **References:** La Sala *et al.* (2009, 2012).

Host: *Larus dominicanus*. **SI:** proventriculus. **Lo:** Balneario Orense (-38.70, -59.7833), Buenos Aires Province. **Material deposited:** MLP–He 4065/1, 4065/2, 4065/3 (cited as 40,065/1, 40,065/2, 40,065/3). **Reference:** Cremonte & Navone (1999).

***Skrjabinoclava* sp.**

Host: *Larus dominicanus*. **SI:** not reported. **Lo:** Mar del Plata (-38.0833, -57.6333), Buenos Aires Province. **Reference:** Labriola & Suriano (2001).

Genus *Stegophorus* Wehr, 1934***Stegophorus diomedae* (Johnston & Mawson, 1942)**

Host: *Thalassarche melanophris* (cited as *Diomedea m.*). **SI:** muscular stomach. **Lo:** Fracasso Beach (-42.4167, -64.1167) and San José Gulf, Península Valdés, Chubut Province. **Material deposited:** MLP–He 5095. **Reference:** Cremonte *et al.* (2002).

Genus *Streptocara* Railliet, Henry & Sisoff, 1912***Streptocara formosensis* Sugimoto, 1930**

Host: *Tachyeres leucocephalus*. **SI:** gizzard. **Lo:** Bahía Melo (-45.65, -65.8833)¹ and San Jorge Gulf (-45.0333, -65.8667)², Chubut Province. **Material deposited:** MLP–He 6661 and CNP–Par 60¹. **References:** Agüero & Díaz (2013)¹; Agüero *et al.* (2015)².

Genus *Syncuaria* Gilbert, 1927***Syncuaria diacantha* Petter, 1961**

Host: *Platalea ajaja*. **SI:** gizzard. **Lo:** Guaminí Lagoon (-37.00, -62.4833), Buenos Aires Province. **Material deposited:** MLP–He 4301/4. **Reference:** Digiani (1999).

***Syncuaria plegadisi* Digiani, 1999**

Host: *Plegadis chihi*. **SI:** gizzard. **Lo:** Punta Blanca (-34.9333, -57.6833), Guaminí Lagoon (-37.00, -62.4833) and Ramallo (-33.4667, -60.0333), Buenos Aires Province. **Material deposited:** MLP–He 3714/3, 3702/4, 3701/4, 3741/5, 3713/5, 3734/5 and IPCAS Helm. Coll. 749. **Reference:** Digiani (1999).

Genus *Synhimantus* Railliet, Henry & Sisoff, 1912***Synhimantus milvagoi* Boero & Led, 1971**

Host: *Phalcoboenus chimango*. **SI:** stomach. **Lo:** Uribelarrea, Buenos Aires Province. **Reference:** Boero & Led (1971).

Subgenus *Synhimantus* (*Dispharynx*) Railliet, Henry & Sisoff, 1912***Synhimantus* (*Dispharynx*) *brevicordon* Schuurmans Stekhoven, 1951**

Host: *Falco sparverius cinnamominus*. **SI:** cavity and stomach. **Lo:** Tañi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 626. **Reference:** Schuurmans Stekhoven (1951). **Comment:** cited as *Dispharynx brevicordon*.

Host: *Muscisaxicola maculirostris maculirostris*. **SI:** cavity. **Lo:** Tañi del Valle, Tucumán Province. **Material**

deposited: CH–N–FML 582. **Reference:** Schuurmans Stekhoven (1951). **Comment:** cited as *Dispharynx brevicordon*.

***Synhimantus (Dispharynx) nasuta* Chabaud, 1975**

Host: *Sturnus vulgaris*. **SI:** esophagus, proventriculus, and gizzard. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6733. **Reference:** Valente *et al.* (2014).

Subgenus *Synhimantus (Synhimantus)* Railliet, Henry & Sisoff, 1912

***Synhimantus (Synhimantus) laticeps* (Rudolphi, 1819)**

Host: *Asio clamator*. **SI:** proventriculus. **Lo:** San Clemente del Tuyú (-36.35, -56.7167), Buenos Aires Province. **Material deposited:** MLP–He 7246. **Reference:** Drago *et al.* (2015). **Comment:** cited as *S. (S.)* cf. *laticeps*.

Host: *Tyto alba*. **SI:** gizzard. **Lo:** Mar Chiquita (-37.7667, -57.45), Buenos Aires Province. **Material deposited:** MLP–He 4609. **Reference:** Etchegoin *et al.* (2000).

Superfamily Aprocotoidea

Family Aprocotidae

Genus *Aprocta* Linstow, 1883

***Aprocta colaptidis* Schuurmans Stekhoven, 1951**

Host: *Colaptes campestris*. **SI:** neck (muscles and under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

Host: *Furnarius rufus*. **SI:** squamous tissue of legs. **Lo:** Aguapey River, Misiones Province. **Reference:** Boero *et al.* (1972a).

Host: *Zonotrichia capensis*. **SI:** squamous tissue of legs. **Lo:** Aguapey River, Misiones Province. **Reference:** Boero *et al.* (1972a).

***Aprocta ptiloscelidis* Schuurmans Stekhoven, 1951**

Host: *Vanellus resplendens* (cited as *Ptiloscelys resplendens*). **SI:** nasal cavity. **Lo:** Tafi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 236. **Reference:** Schuurmans Stekhoven (1951).

Genus *Tetracheilonema* Diesing, 1861a

***Tetracheilonema quadrilabiatum* (Molin, 1858b)**

Host: *Colaptes campestris*. **SI:** kidney (capsular membrane and adipose tissue) and neck (muscles and

under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

Host: *Crypturellus tataupa*. **SI:** thoracic and abdominal cavity. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Hosts: *Nothura darwinii darwinii*; *Nothura darwinii salvadorii*. **SI:** body cavity. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Hosts: *Nothura maculosa*¹; *Nothura maculosa annectens*²; *Nothura maculosa maculosa*³; *Nothura maculosa nigroguttata*⁴. **SI:** kidney (capsular membrane and adipose tissue) and neck (muscles and under the skin)³; thoracic and abdominal cavity^{1, 2, 4}. **Lo:** Maipú, Magdalena and Coronel Dorrego, Buenos Aires Province¹; not reported²; Yabebiry Stream, San Ignacio, Misiones Province³; Buenos Aires Province⁴. **Material deposited:** CH–N–FML 263, 264³. **References:** Schuurmans Stekhoven (1951)³; Boero *et al.* (1968)⁴; Bump & Bump (1969)²; Kaseta (1973)¹.

Superfamily Diplotriaenoidea

Family Diplotriaenidae

Genus *Dicheilonema* Diesing, 1861a

***Dicheilonema rheae* (Owen, 1843)**

Host: *Coscoroba coscoroba*. **SI:** general cavity. **Lo:** Azul, Buenos Aires Province. **Reference:** Gutiérrez (1956).

Hosts: *Rhea americana*^{1, 2, 3, 5, 6, 7}; *Rhea americana albescens* (cited as *Rhea americana rothschildi*)⁴. **SI:** stomach^{1, 2}, egg³, thoracic and abdominal cavity⁴, thoracic region (between flesh and bone)⁵; general cavity (peritoneum)⁶; abdominal and thoracic air sacs, coelomic cavity and subcutaneous tissue of left paw (femoro-tibial joint)⁷. **Lo:** Bahía Blanca, Buenos Aires Province^{1, 2}, Luján, Buenos Aires Province³, Buenos Aires Zoological Garden, Buenos Aires city⁴, San José, San Martín Department, Salta Province⁵; Argentinean Chaco⁶; Buenos Aires Province⁷. **Material deposited:** CH–N–FML 787⁵. **References:** Cobbold (1873¹, 1886²); Berg (1896)³; Marelli & Ubach (1923)⁴; Schuurmans Stekhoven (1951)⁵; Gutiérrez (1956)⁶; Comolli *et al.* (2011)⁷. **Comment:** Cobbold (1873, 1886), Berg (1896) and Marelli & Ubach (1923) cited these specimens as *Filaria horrida* Diesing, 1851. Yamaguti (1961) considered *F. horrida* synonymous of *D. rheae*.

Host: *Rhea pennata garleppi* (cited as *Pterocnemias p. g.*). **SI:** intercostal space (under the skin) and general cavity. **Lo:** Andalgalá, Catamarca Province. **Material deposited:** CH–N–FML 1060, 1071. **Reference:** Schuurmans Stekhoven (1951).

Genus *Diplotriaena* Henry & O'Zoux, 1909***Diplotriaena modesta* Schuurmans Stekhoven, 1951**

Host: *Asthenes modesta modesta*. **SI:** general cavity. **Lo:** Tañi del Valle, Tucumán Province. **Material deposited:** CH–N–FML 624. **Reference:** Schuurmans Stekhoven (1951).

***Diplotriaena muscisaxicola*
Schuurmans Stekhoven, 1951**

Host: *Muscisaxicola maculirostris maculirostris*. **SI:** general cavity. **Lo:** Tañi del Valle, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

Genus *Hamatospiculum* Skrjabin, 1916b***Hamatospiculum flagellispiculosum* Schuurmans Stekhoven, 1951**

Host: *Asio clamator* (cited as *Rhinoptynx clamator maculatus*). **SI:** neck. **Lo:** Bella Vista, Faimallá Departament, Tucumán Province. **Material deposited:** CH–N–FML 72. **Reference:** Schuurmans Stekhoven (1951).

Host: *Campephilus magellanicus*. **SI:** joints of the legs and tail. **Lo:** San Carlos de Bariloche (-41.179, -71.415), Río Negro Province. **Reference:** Casalins *et al.* (2019).

Host: *Myiodynastes maculatus solitarius* (cited as *Myiodynastes solitarius*). **SI:** intestine. **Lo:** Tañi Viejo, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

***Hamatospiculum insigne* (Schneider, 1866)**

Host: *Colaptes campestroides*. **SI:** neck (muscles and under the skin). **Lo:** Yabebiry Stream, San Ignacio, Misiones Province. **Reference:** Schuurmans Stekhoven (1951).

**Genus *Monopetalonema* Diesing, 1861a
Monopetalonema alcedinis (Rudolphi, 1819)**

Host: *Megaceryle torquata* (cited as *Ceryle torquata*). **SI:** abdominal cavity. **Lo:** Tucumán Province. **Reference:** Parona (1900). **Comments:** cited as *Filaria physalura* Bremser in Diesing 1851, and considered as synonymous of *M. alcedinis* by Yamaguti (1961).

**Genus *Serratospiculum* Skrjabin, 1915
Serratospiculum tendo (Nitzsch in Giebel, 1857)**

Host: *Asio flammeus* (cited as *Asio brachyotus*). **SI:** under the skin of the nuchal region. **Lo:** not reported.

Reference: Parona (1900). **Comment:** cited as *Filaria attenuata* Rudolphi 1819.

Host: *Falco peregrinus cassini*. **SI:** air sacs. **Lo:** Maipú Department, Mendoza Province. **Reference:** Ibarra *et al.* (2019).

Superfamily Filarioidea**Family Filariidae****Genus *Filaria* Müller, 1787*****Filaria bipapillosa* Molin, 1858b**

Host: *Athene cunicularia* (cited as *Noctua cunicularia*). **SI:** under the skin. **Lo:** Buenos Aires Province. **Reference:** Parona (1900).

Family Onchocercidae**Genus *Pelecitus* Railliet & Henry, 1910*****Pelecitus fulicaeatrae* (Diesing, 1861a)**

Host: *Podiceps occipitalis*. **SI:** nodule of the tibiotarso-tarsometatarsus articulation. **Lo:** Puerto Madryn (-42.00, -65), Chubut Province. **Material deposited:** MLP–He 5702. **Reference:** Escudero *et al.* (2007).

***Pelecitus tercostatus* (Molin, 1860c)**

Host: *Amazona vinacea*. **SI:** subcutaneous nodes in both legs. **Lo:** San Pedro (-26.6217, -54.1097), Misiones Province. **Material deposited:** MLP–He 6504. **Reference:** Díaz *et al.* (2012).

Host: *Pionus maximiliani* siy. **SI:** leg joints. **Lo:** San Antonio, Misiones Province. **Material deposited:** CH–N–FML 258. **Reference:** Schuurmans Stekhoven (1951).

Superfamily Habronematoidea**Family Habronematidae****Genus *Habronema* Diesing, 1861b*****Habronema* sp.**

Hosts: *Nothura darwinii darwinii*; *N. d. salvadorii*. **SI:** proventriculus and gizzard. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Host: *Nothura maculosa annectens*. **SI:** proventriculus and gizzard. **Lo:** not reported. **Reference:** Bump & Bump (1969).

Genus *Procyrnea* Chabaud, 1958

***Procyrnea choique* Bagnato, Frixione, Digiani &
Cremonte, 2017**

Host: *Rhea pennata*. **SI:** proventriculus. **Lo:** Protected Natural Area Península Valdés (-42.5407, -64.7901),

Chubut Province. **Material deposited:** CNP–Par 144/1, 144/2, 144/3. **Reference:** Bagnato *et al.* (2017).

Family Tetrameridae
Genus *Tetrameres* Creplin, 1846
***Tetrameres* sp.**

Host: *Coscoroba coscoroba*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, La Plata, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Subgenus *Tetrameres* (*Gynaecophila*) Gubanov, 1950
***Tetrameres* (*Gynaecophila*) *aspicula* Digiani, 2000**

Host: *Plegadis chihi*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Punta Blanca (-34.9333, -57.6833), Guaminí (-37.00, -62.4833) and Ramallo (-33.5833, -59.8167), Buenos Aires Province. **Material deposited:** MLP–He 3778/5, 3682/1 and NHMUK 1999.11.29.1-6. **Reference:** Digiani (2000).

Subgenus *Tetrameres* (*Petrowimeres*)
Chertkova, 1953

***Tetrameres* (*Petrowimeres*) *fissispina* (Diesing, 1861a)**

Host: *Lophonetta specularioides*. **SI:** proventricular glands. **Lo:** San Jorge Gulf (-45.0333, -65.8667), Chubut Province. **Material deposited:** MLP–He 7022 and CNP–Par (numbers not provided). **Reference:** Agüero *et al.* (2015).

Subgenus *Tetrameres* (*Tetrameres*) Creplin, 1846
***Tetrameres* (*Tetrameres*) *megaphasmidiata* Cremonte, Digiani, Bala & Navone, 2001**

Host: *Calidris fuscicollis*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Fracasso Beach, San Jorge Gulf (-42.4167, -64.1167), Chubut Province. **Material deposited:** MLP–He 4617. **Reference:** Cremonte *et al.* (2001).

Host: *Charadrius falklandicus*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Fracasso Beach, San Jorge Gulf (-42.4167, -64.1167), Chubut Province. **Material deposited:** MLP–He 4614, 4615, 4616, 4618. **Reference:** Cremonte *et al.* (2001).

***Tetrameres* (*Tetrameres*) *salina* Núñez, Drago, Digiani & Lunaschi, 2017**

Host: *Phoenicopterus chilensis*. **SI:** proventriculus. **Lo:** Epecuén Lake (-37.2167, -62.85) and Del Monte Lake (-36.9833, -62.4667), Buenos Aires Province. **Material deposited:** MLP–He 7254, 7255, 7256, 7257. **Reference:** Núñez *et al.* (2017).

Tetrameres* (*Tetrameres*) *spirospiculum
Pinto & Vicente, 1995

Host: *Theristicus melanopis* (as *Theristicus melanopis melanopis*). **SI:** proventriculus. **Lo:** Rahue (-39.35, -70.9167), Neuquén, Province. **Material deposited:** MLP–He 4600/2. **Reference:** Digiani & Cremonte (2001).

***Tetrameres* (*Tetrameres*) *tinamicola* Pence, Mollhagen & Prestwood, 1975**

Hosts: *Eudromia elegans albida*; *Eudromia elegans elegans*. **SI:** proventriculus, females within the glands and males free in the lumen. **Lo:** Tupungato, Mendoza Province and San Luis Province. **Material deposited:** USNM 1369385, 1369386, 1369387 (cited as 73822, 72823, 73824). **Reference:** Pence *et al.* (1975).

Genus *Microtetrameres* (Travassos, 1915)
Microtetrameres* *canadensis argentinensis
Labriola & Suriano, 1996

Host: *Bubulcus ibis ibis*. **SI:** proventriculus. **Lo:** De Monte pond, San Miguel del Monte (-35.45, -58.7833), Buenos Aires Province. **Material deposited:** MACN–pa 384. **Reference:** Labriola & Suriano (1996).

***Microtetrameres* *urubitinga* Dueñas Díaz, Drago & Núñez, 2018**

Host: *Buteogallus urubitinga*. **SI:** proventriculus; females within the glands, males free in the lumen. **Lo:** La Marcela farm (-26.2931, -59.1439), Pirané, Formosa Province. **Material deposited:** MLP–He 7447, 7448, 7449, 7450. **Reference:** Dueñas Díaz *et al.* (2018).

***Microtetrameres* sp.**

Host: *Coryphospingus cucullatus*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Cyanocorax chrysops*. **SI:** proventriculus. **Lo:** La Plata Zoological Garden, Buenos Aires Province. **Reference:** Boero & Led (1968).

Host: *Sturnus vulgaris*. **SI:** proventriculus. **Lo:** Bernal (-34.6956, -58.2667), Buenos Aires Province. **Material deposited:** MLP–He 6734. **Reference:** Valente *et al.* (2014).

Superfamily Physalopteroidea

Family Physalopteridae

Genus Physaloptera Rudolphi, 1819

Physaloptera alata Rudolphi, 1819

Host: *Circus cinereus*. **SI:** cavity. **Lo:** Tañi del Valle, Tucumán Province. **Reference:** Schuurmans Stekhoven (1951).

Superfamily Thelazioidea

Family Thelaziidae

Genus Thelazia Bosc, 1819

Thelazia longicaudata Schuurmans Stekhoven, 1951

Host: *Strix rufipes rufipes*. **SI:** eyes. **Lo:** Pozo Hondo, Santiago del Estero Province. **Material deposited:** CH–N–FML 1297. **Reference:** Schuurmans Stekhoven (1951).

Order Strongylida

Superfamily Strongyloidea

Family Deletrocephalidae

Genus Paradeletrocephalus Freitas & Lent, 1947

Paradeletrocephalus minor (Molin, 1861)

Host: *Rhea americana*. **SI:** intestine. **Lo:** Los Planteles farm, Tandil, Buenos Aires Province¹. **References:** Parona (1900), Comolli *et al.* (2006)¹. **Comment:** cited as *Strongylus dimidiatus* (Diesing, 1851) by Parona (1900). This species was synonymized with *P. minor* by Freitas & Lent (1947).

Superfamily Trichostrongyloidea

Family Amidostomatidae

Genus Epomidiostomum Skrjabin, 1916a

Epomidiostomum vogelsangi Travassos, 1937

Host: *Cygnus melancoryphus*. **SI:** gizzard. **Lo:** La Plata Zoological Garden, Buenos Aires Province¹; Nuevo Gulf (-45.0333, -65.8667) and Bahía Engaño coast (-43.3333, -65.3333), Chubut Province². **Material deposited:** MLP–He 7024 and CNP–Par². **References:** Boero & Led (1968)¹; Agüero *et al.* (2015)².

Species incertae sedis

Microfilaria corderoi Mazza & Franke, 1928 in the bloodstream of *Campephilus leucopogon* (cited as *Scapanus leucopogon*) (Piciformes, Picidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria fonsecai Mazza & Franke, 1928 in the bloodstream of *Coryphospingus cucullatus* (Passeriformes, Thraupidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria parodii Mazza & Franke, 1928 in the bloodstream of *Cyanocorax chrysops* (Passeriformes, Corvidae) from Zapla, Jujuy Province (Mazza & Franke, 1928).

Microfilaria rojasi Mazza, Deautier & Steullet, 1927 in the bloodstream of *Ictinia plumbea* (Accipitriformes, Accipitridae) from Colonia Azara, Misiones (Mazza *et al.*, 1927).

Microfilariae in the bloodstream of *Turdus leucomelas* (Passeriformes, Turdidae) from Tucumán Province (Biglieri, 1918).

Species inquirenda

Cosmocephalus argentinensis Boero & Led, 1970 was briefly described in the proceedings of a congress, based only on female specimens found parasitizing *Spheniscus magellanicus* from the La Plata Zoological Garden. Later, it was considered *species inquirenda* by Díaz *et al.* (2001) because of its inadequate description, no type material deposited and not formally published.

Host-parasite list

Order Accipitriformes

Family Accipitridae

Buteogallus urubitinga

Microtetrameres urubitinga

Circus cinereus

Physaloptera alata

Order Anseriformes

Family Anatidae

Coscoroba coscoroba

Dicheilonema rheae

Tetrameres sp.

Cygnus melancoryphus

Echinuria cygni

Epomidiostomum vogelsangi

Lophonetta specularioides

Echinuria uncinata

Tetrameres (Petrowimeres) fissispina

Netta peposaca

Echinuria uncinata

Tachyeres leucocephalus

Sciadiocara legendrei

Streptocara formosensis

Order Charadriiformes

Family Charadriidae

Charadrius falklandicus

Tetrameres (Tetrameres) megaphasmidiata

Oreopholus ruficollis

Oxynema sp.

Vanellus resplendens

Aprocta ptiloscelidis

Family Haematopodidae

Haematopus palliatus

Sciadiocara haematopodi

Family Laridae

Larus atlanticus

Pectinospirura argentata

Sciadiocara sp.

Skrjabinoclava andersoni

Larus dominicanus

Ancyracanthopsis winegardi

Capillaria sp.

Contracaecum sp.

Cosmocephalus obvelatus

Eucoleus sp.

Paracuaria adunca

Pectinospirura argentata

Sciadiocara haematopodi

Skrjabinoclava andersoni

Skrjabinoclava sp.

Family Scolopacidae

Calidris bairdii

Echinuria skrjabiniensis

Calidris fuscicollis

Echinuria skrjabiniensis

Tetrameres (Tetrameres) megaphasmidiata

Order Coraciiformes

Family Alcedinidae

Megaceryle torquata

Monopetalonema alcedinis

Order Falconiformes

Family Falconidae

Falco peregrinus cassini

Serratospiculum tendo

Falco sparverius cinnamominus

Synhimantus (Dispharynx) brevicordon

Phalcoboenus chimango

Synhimantus milvagai

Order Gruiformes

Family Rallidae

Fulica leucoptera

Contracaecum sp.

Order Passeriformes

Family Corvidae

Cyanocorax chrysops

Microtetrameres sp.

Family Furnariidae

Asthenes modesta modesta

Diplotriaena modesta

Furnarius rufus

Aprocta colaptidis

Family Passerellidae

Zonotrichia capensis

Aprocta colaptidis

Family Sturnidae

Sturnus vulgaris (introduced species)

Microtetrameres sp.

Ornithocapillaria ovopunctata

Pterothominx exilis

Synhimantus (Dispharynx) nasuta

Family Thraupidae

Coryphospingus cucullatus

Microtetrameres sp.

Family Tyrannidae

Muscisaxicola maculirostris maculirostris

Synhimantus (Dispharynx) brevicordon

Diplotriaena muscisaxicola

Myiodynastes maculatus solitarius

Hamatospiculum flagellispiculosum

Order Pelecaniformes

Family Ardeidae

Ardea alba

Contracaecum multipapillatum

Ardea alba egretta

Contracaecum microcephalum

Contracaecum multipapillatum

Ardea cocoi

Contracaecum microcephalum

Bubulcus ibis ibis

Contracaecum multipapillatum

Microtetrameres canadensis argentinensis

Egretta thula thula

Contracaecum multipapillatum

Nycticorax nycticorax

Contracaecum microcephalum

Family Ciconiidae

Ciconia maguari

Desportesius longevaginatus

Family Phalacrocoracidae

Phalacrocorax albiventer

Contracaecum travassosi

Contracaecum sp.

Phalacrocorax atriceps

Contracaecum chubutensis

Contracaecum sp.

Ingliseria cirrohamata

Phalacrocorax brasilianus

- Contracaecum australe*
- Contracaecum* sp.
- Ingliseria cirrohamata*

Phalacrocorax gaimardi

- Contracaecum* sp.
- Contracaecum australe*

Family Threskiornithidae

Platalea ajaja

- Syncuaria diacantha*

Plegadis chihi

- Porrocaecum heteropterum*
- Syncuaria plegadisi*
- Tetrameres (Gynaecophila) aspicula*

Theristicus melanopis

- Porrocaecum heteropterum*
- Tetrameres (Tetrameres) spirospiculum*

Order Phoenicopteriformes

Family Phoenicopteridae

Phoenicopus chilensis

- Echinuria skrjabiniensis*
- Tetrameres (Tetrameres) salina*
- Tetrameres* sp.

Order Piciformes

Family Picidae

Campephilus magellanicus

- Hamatospiculum flagellispiculosum*

Colaptes campestris

- Aprocta colaptidis*
- Hamatospiculum insigne*
- Tetracheilonema quadrilabiatum*

Order Podicipediformes

Family Podicipedidae

Podiceps major

- Eustrongylides tubifex*

Podiceps occipitalis

- Pelecitus fulicaeatrae*

Rollandia rolland

- Contracaecum ovale*

Order Psittaciformes

Family Psittacidae

Amazona vinacea

- Pelecitus tercostatus*

Ara chloropterus

- Ascaridia hermaphrodita*

Pionus maximiliani

- Ascaridia hermaphrodita*
- Pelecitus tercostatus*

Order Procellariiformes

Family Diomedidae

Thalassarche melanophris

- Contracaecum pelagicum*
- Stegophorus diomedae*

Order Rheiformes

Family Rheidae

Rhea americana

- Dicheilonema rheae*
- Paradeletrocephalus minor*

Rhea americana albescens

- Dicheilonema rheae*

Rhea pennata

- Procyrnea choique*

Rhea pennata garleppi

- Dicheilonema rheae*

Order Sphenisciformes

Family Spheniscidae

Spheniscus magellanicus

- Contracaecum mirounga*
- Contracaecum pelagicum*
- Contracaecum* sp.
- Cosmocephalus obvelatus*

Eudyptes chrysocome

- Contracaecum pelagicum*

Order Strigiformes

Family Tytonidae

Tyto alba

- Synhimantus (Synhimantus) laticeps*

Family Strigidae

Asio flammeus

- Serratospiculum tendo*

Asio clamator

- Hamatospiculum flagellispiculosum*
- Synhimantus (Synhimantus) cf. laticeps*

Athene cunicularia

- Filaria bipapillosa*

Megascops choliba

- Skrjabinura* sp.

Strix rufipes rufipes

- Thelazia longicaudata*

Order Tinamiformes

Family Tinamidae

Crypturellus tataupa

- Odontoterakis valvata*
- Subulura strongylina*
- Tetracheilonema quadrilabiatum*

Eudromia elegans

- Eudromoxyura aspiculuris*

Eudromia elegans albida

- Eudromoxyura aspiculuris*
- Tetrameres (Tetrameres) tinamicola*

Eudromia elegans elegans*Eudromoxyura aspiculuris**Tetrameres (Tetrameres) tinamicola****Eudromia elegans wetmorei****Eudromoxyura aspiculuris****Nothura darwinii darwinii****Habronema* sp.*Heterakis* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura darwinii salvadorii****Habronema* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura maculosa****Eucoleus penidoi**Odontoterakis valvata**Subulura olympioi**Tetracheilonema quadrilabiatum****Nothura maculosa annectens****Ascaridia* sp.*Habronema* sp.*Heterakis* sp.*Subulura* sp.*Tetracheilonema quadrilabiatum****Nothura maculosa maculosa****Tetracheilonema quadrilabiatum****Nothura maculosa nigroguttata****Capillaria* sp.*Odontoterakis valvata**Tetracheilonema quadrilabiatum***DISCUSSION**

Helminths of wild birds have been less studied than those of other vertebrates, mainly because the birds are one of the most charismatic and protected groups. Then, it is difficult to obtain a sufficient number of these hosts because many are protected by national and international laws (Pérez Ponce de León *et al.*, 2011). Much of the information available on parasites in wild birds comes from studies carried out in birds that died by natural causes (Núñez *et al.*, 2017, 2018). Other important sources of information for taxonomic studies on helminths of birds are the helminthological collections, which preserve information on spatial and temporal biodiversity (Drago *et al.*, 2018).

Reports of nematodes parasitizing wild birds were found in 17 of the 23 Argentinean Provinces. Most of the studies were carried out in Buenos Aires Province, with 63 reports, followed by Chubut and Tucumán Province with 38 and 11 reports, respectively. In Chaco, Entre Ríos, Jujuy, La Rioja, Santa Fe and Tierra del Fuego Provinces no nematodes have been reported parasitizing wild birds. The rest of the Provinces presented less

than ten records. Sixteen reports were carried out in Zoological Gardens. This seems to be more related to the development of this line of work in scientific research centers in these Provinces, than with the real diversity in each Province, i.e. Centro de Estudios Parasitológicos y de Vectores (CEPAVE), Museo de la Plata and Facultad de Ciencias Veterinarias de La Plata in Buenos Aires Province, Centro Nacional Patagónico (CENPAT) in Chubut Province and Instituto Miguel Lillo in Tucumán Province. Sixteen reports were carried out in Zoological Gardens.

In Argentina, 1042 species of birds (1033 native and nine introduced species) belonging to 86 families have been reported (Roesler & González Táboas, 2016); however, only 65 bird species (6.24%) grouped into 29 families have been reported to be parasitized by adult nematodes. The families of birds with the highest number of reported taxa are Tinamidae, Laridae, Anatidae and Phalacrocoracidae with 12, 11, 8 and 7 taxa reported, respectively. The bird species with the highest number of taxa of nematodes reported are *Larus dominicanus* (Laridae) and *Nothura maculosa* (Tinamidae) with 10 and 9 taxa reported, respectively. *Larus dominicanus* is an abundant species that inhabits a great diversity of environments and has a generalist and opportunistic diet (Yorio *et al.*, 2013), which means that it would be more likely to acquire a wide variety of nematodes with indirect life cycle. In addition, the helminths of these birds have been studied in numerous opportunities, being also the bird species with the highest number of digenean species reported (see Lunaschi *et al.*, 2007; Drago & Lunaschi, 2015). The higher number of reports in tinamids may be related to the abundance of these birds and their ease of collection, because it is a species consumed by local inhabitants and the contribution of rural hunters with viscera is frequent. Only one introduced species, the European starling (*S. vulgaris*), was reported as host of nematodes. The first sightings of these birds in Argentina were in the city of Buenos Aires in 1987, expanding its distribution to various Provinces (Jensen, 2008). Although only one paper related to its helminths was published, three nominal species and one taxon identified at generic level of nematodes were reported (Valente *et al.*, 2014).

The highest number of taxa of nematodes was recorded in the family Acuariidae with 20 nominal species and two taxa identified at generic level, followed by Anisakidae with eight and one, and Tetrameridae with eight and two, respectively. This could be related to the preference of habitat of studied birds, in this case mostly aquatic, given that these three families of Nematodes possess mainly aquatic life cycles.

In addition, five species of passeriform, accipitriform and piciform birds were reported as hosts of larval stages of nematodes (microfilariae) described as species of the genus *Microfilaria*. The name “*Microfilaria*” can be found as an informal generic name referring to a collective

group of blood filaroids, as proposed by Cobbod (1882). However, this genus is not valid and these names are also invalid. Unfortunately, it is not possible to assign these species to any other genus because adults are unknown, for proper identification it is necessary to found the adults housed in the subcutaneous tissue associated with these microfilariae. Numerous species of Filarioidea are known parasitizing birds (see Schmidt-Rhaesa, 2014), although in Argentina only two genera, *Pelecitus* (Onchocercidae) and *Filaria* (Filariidae), have been reported.

The group of helminths most studied in Argentinean birds are the digeneans (Drago & Lunaschi, 2015), with almost twice more nominal species reported than for nematodes (112 vs. 64), however the number of bird species studied is similar (70 vs. 65). The three families of birds with the highest number of digeneans reported are Laridae, Ardeidae and Accipitridae, while the families with the highest number of nematodes reported are Tinamidae, Laridae and Anatidae.

When comparing the number of species of nematodes in Argentinean birds with the richness found in other regions of similar birds diversity, for example Mexico, with 1096 bird species, it can be observed similar values of nematodes species. For example, García-Prieto *et al.* (2014) reported 64 nominal species and 17 indeterminate taxa of nematodes, parasitizing 65 bird species, which represents 5.9% of the birds present in this country.

These results highlights the need for further investigation and research on this group of parasites, expanding the number of bird species examined, especially in poorly explored regions.

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On linyphiid spiders from Java, Indonesia, with the description of three new genera and four new species (Araneae: Linyphiidae)

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Abstract: Three new genera and four new species are described from Java, Indonesia: *Javagone* gen. nov., with *Javagone maribaya* sp. nov. as the type species; *Javanaria* gen. nov., with *Javanaria gracilipes* sp. nov. as the type species; *Javanyphia* gen. nov., with *Javanyphia gede* sp. nov. as the type species, and *Parameioneta javaensis* sp. nov. A new synonym and a new combination are proposed: *Walckenaeria caobangensis* Tu & Li, 2004 syn. nov. is a junior synonym of *Nasootia asocialis* (Wunderlich, 1974), *Parameioneta sulawesi* (Tanasevitch, in Tanasevitch & Stenchly, 2012) comb. nov. is transferred from *Maorineta* Millidge, 1988. The linyphiid fauna of Java (including the new species described here) contains 20 species, is characterized as Oriental, demonstrates weak relations to the East Asian Palaearctic fauna and does not show any relations to the rich linyphiid fauna of the neighboring Australian Region. An annotated list of the Javanese linyphiids is given and the zoogeographical composition of the fauna is briefly discussed.

Keywords: Taxonomy - faunistics - Oriental Region - Australian Region - Southeast Asia.

INTRODUCTION

The linyphiid spider fauna of the Indonesian island of Java was previously known to contain 15 species, seven of which are known only from there (Simon, 1894, 1905; Helsdingen, 1979, 1985a; Millidge & Russell-Smith, 1992; Tanasevitch, 2017a, b, 2019a, b). Four additional new species from Java, three of them each belonging to a new genus, were found in the spider collection of the Muséum d'histoire naturelle de Genève, Switzerland (MHNG). The present paper provides descriptions of new taxa, some nomenclature changes, and a short zoogeographical analysis of the Javanese linyphiid spider fauna.

MATERIAL AND METHODS

This paper is based on material kept at the MHNG. Sample numbers are given in square brackets. Specimens preserved in 70% ethanol were studied using a MBS-9 stereomicroscope. A Levenhuk C-800 digital camera was used for photos. The terminology of copulatory organs mainly follows that of Helsdingen (1965), Hormiga (2000) and Tanasevitch (1998). Leg chaetotaxy is presented in a formula, e.g., 2.2.1.1, which refers to the

number of dorsal spines on tibiae I-IV. The sequence of leg segment measurements is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. Scale lines in the figures correspond to 0.1 mm unless indicated otherwise. Figure numbers are given above the scale lines, the alternative distance below them.

Abbreviations

a.s.l.	above sea-level
C	convector <i>sensu</i> Tanasevitch (1998)
D	duct
DSA	distal suprategular apophysis <i>sensu</i> Hormiga (2000)
E	embolus
EP	embolus proper <i>sensu</i> Saaristo (1971)
LC	lamella characteristica
MB	main body of embolus
MM	median membrane <i>sensu</i> Helsdingen (1965)
Mt	metatarsus
Pr	protegulum <i>sensu</i> Holm (1979)
R	radix
TA	terminal apophysis <i>sensu</i> Helsdingen (1965)
TO	tegular outgrowth
TmI	position of trichobothrium on metatarsus I

TAXONOMY

Order Araneae Clerck, 1757

Family Linyphiidae Blackwall, 1859

Subfamily Erigoninae Emerton, 1882

Javagone gen. nov.

Type species: *Javagone maribaya* sp. nov.

Etymology: The generic name is a combination of two words: “Java”, the “terra typica”, and part of the generic name *Erigone*. The gender is feminine.

Diagnosis: The genus contains medium-sized erigonines, with a total length of about 1.7, which are characterized by the following combination of somatic and genitalic characters:

- 1) Carapace unmodified, eyes somewhat enlarged, cephalic pits (= sulci) absent (Figs 1-4).
- 2) Legs relatively long and slender.
- 3) Leg chaetotaxy formula 1.1.1.1; metatarsi I-IV each with a trichobothrium; TmI about 0.31.
- 4) Palpal tibia simple, slightly modified (Figs 10, 13).
- 5) Paracymbium relatively large, L-shaped (Fig. 12).
- 6) Median membrane reduced.
- 7) Distal suprategular apophysis moderately developed (see Fig. 10).
- 8) Embolus relatively thin, semi-looped; radix small; convector present, massive (Figs 10-11, 14).

Species included: Only the type species, *Javagone maribaya* sp. nov.

Taxonomic remarks: Among more than 400 known genera of the subfamily Erigoninae only 23 show the leg chaetotaxy formula 1.1.1.1 coupled with the presence of a trichobothrium on MtIV. No other genera with the same chaeto- and trichobothriotaxy have been recorded from the Oriental Region, except for the monotypic genus *Cirrosus* Zhao & Li, 2014, known from Xishuangbanna, Yunnan Province, China (Zhao & Li, 2014), an area situated on the border between the Palaearctic and Oriental realms. Judging from the male palp conformation, *Javagone maribaya* sp. nov. does not fit into *Cirrosus* or any other known linyphiid genus. The peculiar structure of the male palp and the absence of the corresponding female make it difficult at the moment to evaluate the possible relationships of the new genus. It is most likely with still unknown Oriental erigonines.

Distribution: Known only from the type locality on Java, Indonesia.

Javagone maribaya sp. nov.

Figs 1-4, 10-14

Holotype: MHNG; male [sample 20a]; INDONESIA, Java, West Java Province, 22 km NE of Bandung, Maribaya, hand collecting; 27.VII.1984; leg. J. Robert.

Etymology: The specific epithet is a name in apposition referring to the type locality, the Maribaya Nature Area, Java, Indonesia.

Description: *Male holotype.* Total length 1.64. Carapace unmodified, as in Figs 1-4, 0.75 long, 0.63 wide, pale brown. Eyes slightly enlarged, as in Figs 3-4. Chelicerae 0.30 long, mastidion absent. Legs yellow to pale yellow. Leg I 3.16 long (0.90 + 0.23 + 0.78 + 0.75 + 0.50), leg IV 3.20 (0.90 + 0.20 + 0.85 + 0.80 + 0.45). Chaetotaxy 1.1.1.1. Length of spines 1-2 diameters of corresponding leg segment. Each metatarsus with a trichobothrium. TmI 0.31. Palp (Figs 10-14): Tibia short, slightly widening distally. Paracymbium relatively large, L-shaped, hooked apically. Distal suprategular apophysis short, linguiform, rounded distally. Median membrane reduced. Convector massive, complex, boat-shaped, its largest lobe directed distad and covering embolus. Embolus relatively thin, semi-looped, with a membranous edge on inner side. Radix very small, triangular. Abdomen 1.05 long, 0.63 wide, pale grey, almost white, with slightly darkened end, as shown in Fig. 1.

Female. Unknown.

Taxonomic remarks: See above under genus description.

Distribution: Known only from the type locality on Java, Indonesia.

Range: Javanese.

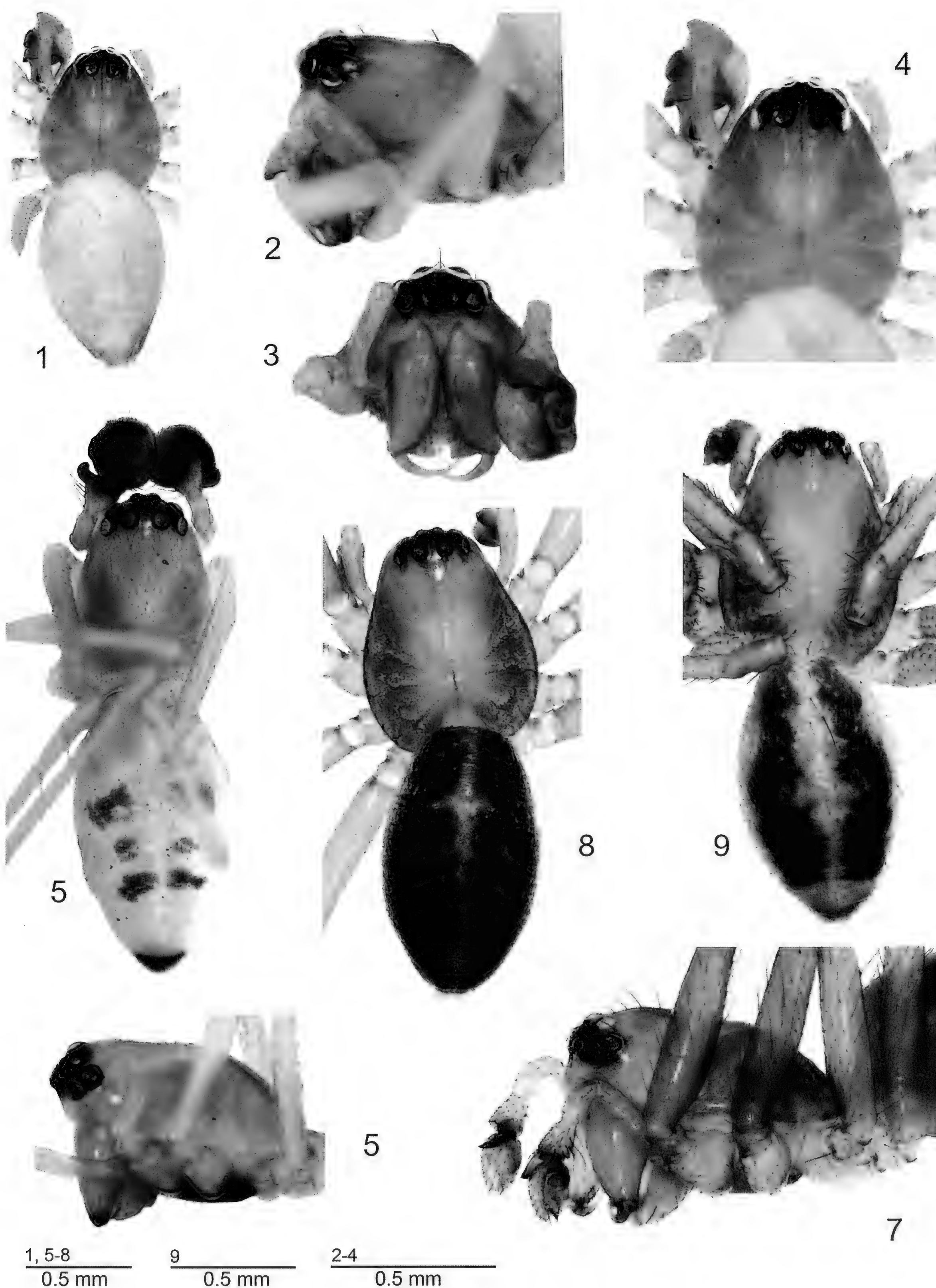
Javanaria gen. nov.

Type species: *Javanaria gracilipes* sp. nov.

Etymology: The generic name is a combination of two words: “Java”, the “terra typica”, and a part of the generic name *Nasoonaria*. Males of *Nasoonaria*, like males of the type species of the new genus, have an extremely developed distal suprategular apophysis. The gender of the new name is feminine.

Diagnosis: The genus contains large-sized erigonines with relatively long and slender legs, with a total length of 2.2-2.3, which are characterized by the following combination of somatic and genitalic characters:

- 1) Carapace slightly modified, eyes somewhat enlarged, cephalic pits (= sulci) absent (Figs 5-6).
- 2) Abdomen with a dorsal pattern (Fig. 5).
- 3) Legs relatively long and slender.
- 4) Chaetotaxy formula 2.2.1.1; each metatarsus with a trichobothrium; TmI 0.52-0.60.
- 5) Palpal tibia unmodified.
- 6) Paracymbium long and narrow (Fig. 15).
- 7) Median membrane strongly reduced.
- 8) Distal suprategular apophysis extremely developed, massive (Figs 15, 18).



Figs 1-9. Photographs of males: the holotype of *Javagone maribaya* sp. nov. (1-4), the paratype of *Javanaria gracilipes* sp. nov. (5-6) and the holotype (7) and both paratypes (8-9) of *Javanyphia gede* sp. nov. (1, 5, 8-9) Habitus, dorsal view. (2, 6-7) Prosoma, lateral view. (3) Prosoma, frontal view. (4). Prosoma, dorsal view.

9) Radix strongly reduced, embolus relatively wide, flat, convector absent (Figs 19-20).

Species included: Only the type species, *Javanaria gracilipes* sp. nov.

Taxonomic remarks: In its large size and long legs *J. gracilipes* sp. nov. resembles some taxa of the subfamilies Linyphiinae and Micronetinae, but its palpal conformation is of the classically erigonine-type. The palp of *J. gracilipes* sp. nov. somewhat resembles that of *Nasoonaria*. However, this similarity is superficial, mainly due to the large distal suprategular apophysis. Today it is impossible to find a genus among the known erigonines to which *Javanaria* gen. nov. appears

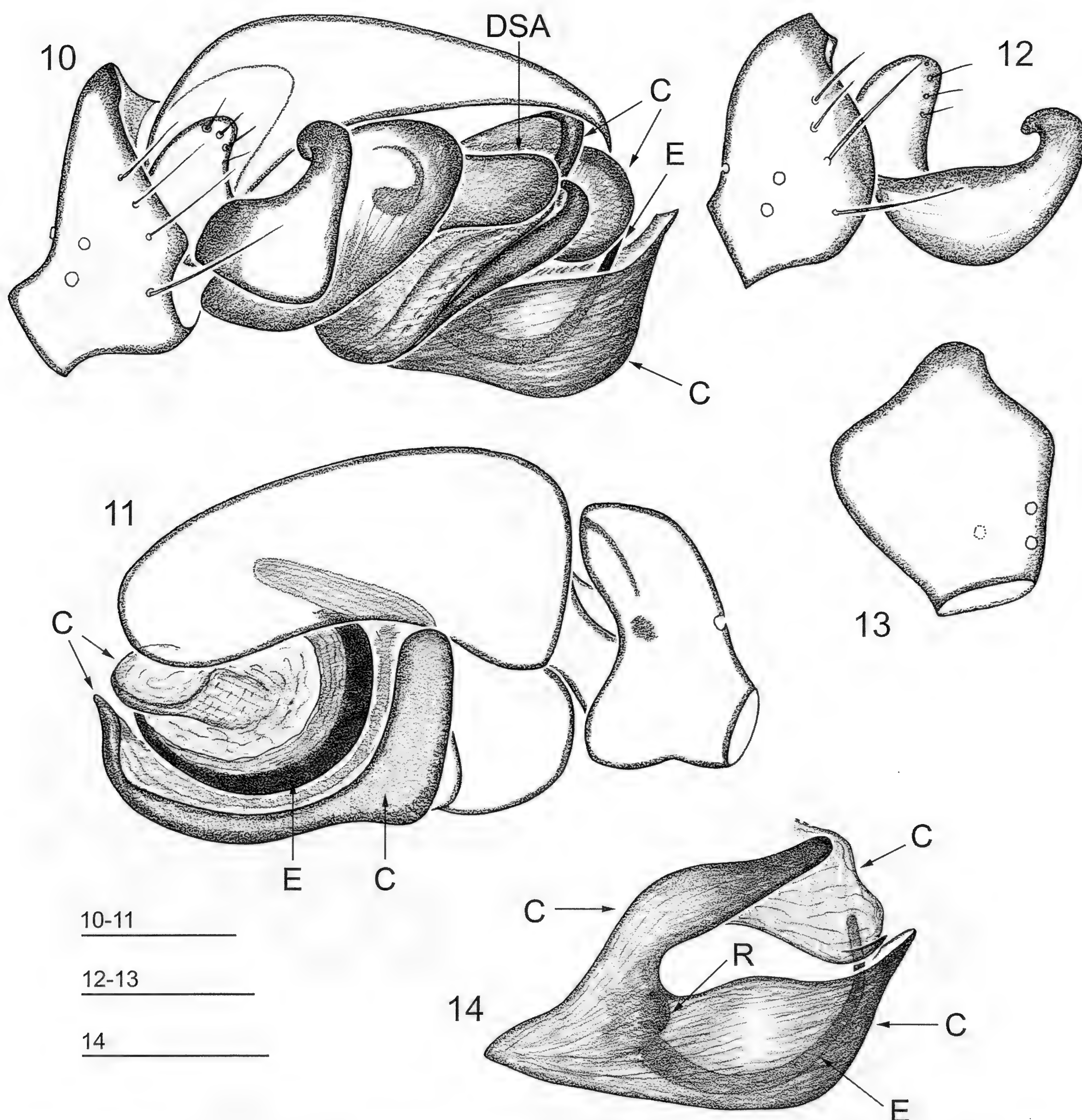
to be close. Most likely the closest relatives will be found among taxa not yet described.

Distribution: Known only from the type locality on Java, Indonesia.

***Javanaria gracilipes* sp. nov.**

Figs 5-6, 15-20

Holotype: MHNG; male [sample Sar-87/28]; INDONESIA, Java, West Java Province, Cibodas, environs of Botanical Garden, 1250-1300 m a.s.l., beating from vegetation in the low part of the garden; 27.XI.1987; leg. C. Lienhard.



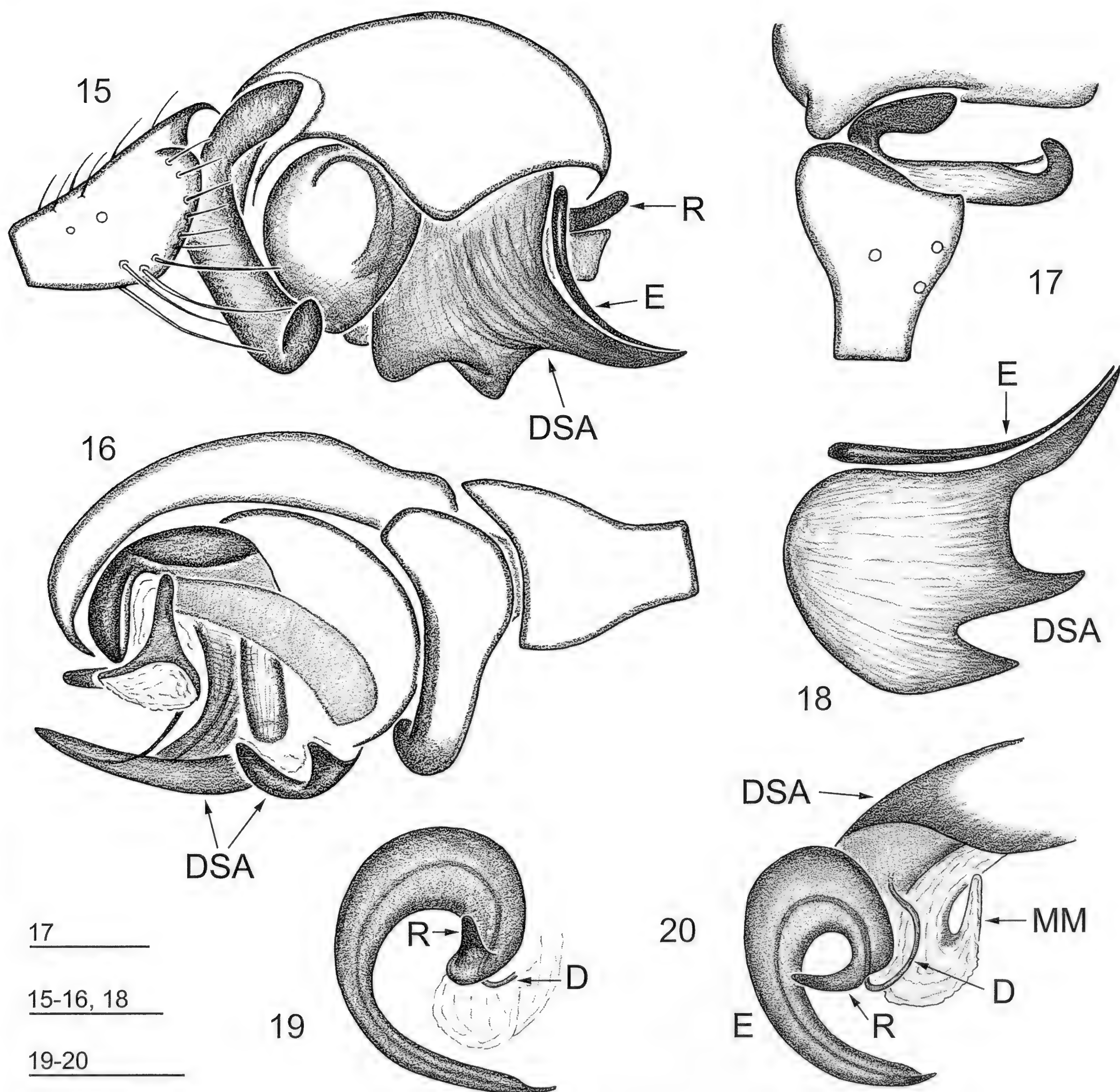
Figs 10-14. Details of male palp structure of *Javagone maribaya* sp. nov., holotype. (10-11) Right palp, retrolateral and prolateral views, respectively. (12) Palpal tibia and paracymbium, lateral view. (13) Palpal tibia, dorsal view. (14) Embolic division, retrolateral view.

Paratype: MHNG; male; collected together with the holotype.

Etymology: The specific epithet is a Latin noun referring to the relatively long and slender legs of the holotype.

Description: *Male paratype*. Total length 2.20. Carapace slightly modified: its ocular part protruding forward, as shown in Fig. 6; 0.95 long, 0.65 wide, reddish pale brown. Eyes somewhat enlarged. Chelicerae 0.38 long, mastidion absent. Legs pale yellow to yellow. Leg I 4.51 long ($1.25 + 0.25 + 1.15 + 1.13 +$

0.73), leg IV 3.89 ($1.13 + 0.25 + 0.93 + 0.98 + 0.60$). Chaetotaxy 2.2.1.1. Length of spines 1-2.5 diameters of corresponding leg segment. Each metatarsus with a trichobothrium. TmI 0.59. Palp (Figs 15-20): Tibia widened distally, unmodified. Paracymbium slender, its middle part long, its distal part short and bent. Distal suprategular apophysis massive, wide, with three long and pointed processes, the distal one longest. Median membrane strongly reduced, developed as a short, narrow and curved apophysis. Embolus flat, wide at base, gradually narrowing towards needle-shaped apex. Radix strongly reduced, developed as a small, narrow



Figs 15-20. Details of male palp structure of *Javanaria gracilipes* sp. nov., paratype. (15-16) Right palp, retrolateral and prolateral views, respectively. (17) Palpal tibia, paracymbium and proximal part of cymbium, dorsal view. (18) Distal part of embolus and distal suprategular apophysis, ventral view. (19) Embolic division, ventral view. (20) Distal suprategular apophysis, median membrane and embolic division, dorso-lateral view.

outgrowth at base of embolus. Abdomen 1.25 long, 0.70 wide, white, dorsal pattern as in Fig. 5.

Female. Unknown.

Taxonomic remarks: See above under genus description.

Distribution: Known only from the type locality on Java, Indonesia.

Range: Javanese.

Javanyphia gen. nov.

Type species: *Javanyphia gede* sp. nov.

Diagnosis: The genus contains large-sized, linyphiine-like erigonines, with a total length of 2.3-2.4, which are characterized by the following combination of somatic and genitalic characters:

- 1) Carapace unmodified, eyes normal in size, cephalic pits (= sulci) absent (Figs 7-9).
- 2) Abdomen with a dorsal pattern (Figs 7-8).
- 3) Chaetotaxy formula 2.2.1.1; each metatarsus with a trichobothrium; TmI 0.78-0.82.
- 4) Palpal tibia modified, with a distal claw-shaped apophysis (Figs 21, 23).
- 5) Paracymbium relatively small.
- 6) Tegulum with a protegulum (Fig. 21)
- 7) Median membrane reduced.
- 8) Distal suprategular apophysis moderately developed (Fig. 25).
- 9) Embolus relatively short, slightly curved; radix wide, flat; convector absent (Figs 22, 25).

Etymology: The generic name is a combination of two words: "Java", the "terra typica", and a part of the genus name *Linyphia*. The gender is feminine.

Species included: Only the type species, *Javanyphia gede* sp. nov.

Taxonomic remarks: There are many large-sized, robust erigonines in an informal group which show the leg chaetotaxy formula 2.2.1.1 coupled with the presence of a trichobothrium on MtIV, e.g. *Gnathonarium* Karsch, 1881, *Gongylidium* Menge, 1868, *Ummeliata* Strand, 1942, etc. In its habitus the new genus resembles these genera, and especially *Tmeticus* Menge, 1868, but it has a different palp structure. The palp conformation of *Javanyphia* gen. nov. is characterized by a simple structure of the distal suprategular apophysis and of the embolic division, and their shapes resemble those of the Palaearctic-West Nearctic *Leptorhoptrum robustum* (Westring, 1851), which has the chaetotaxy formula 2.2.2.2. This similarity seems to be only a superficial resemblance, and finding a female will allow us to correctly determine the placement of the genus in the subfamily Erigoninae.

Distribution: Known only from the type locality on Java, Indonesia.

Javanyphia gede sp. nov.

Figs 7-9, 21-25

Holotype: MHNG; male [sample AS-05/11]; INDONESIA, Java, West Java Province, Gunung [= Mount] Gede Pangrango National Park, near Cibodas, 6°47'0"S, 107°01'0"E, 1450-1600 m a.s.l.; 4.-11.V.2005; leg. A. Schulz.

Paratypes: MHNG; 2 males [sample 5a]; INDONESIA, West Java Province, Mt Gede, about 50 km SE of Bogor, 2600 m a.s.l., Ericaceae forest, sifting of vegetational debris; 5.XI.1989; leg. D. Burckhardt, I. Löbl & D. Agosti.

Etymology: The specific epithet is a name in apposition referring to the place of origin, Mt Gede and its environs.

Description: *Male paratype.* Total length 2.30. Carapace unmodified, as shown in Figs 7-9, 1.13 long, 0.83 wide, pale brown with darkened radial strips between coxal elevations. Chelicerae 0.45 long, mastidion absent. Anterior margin of fang groove with five strong teeth, posterior margin with 4-5 small teeth. Legs pale brown to yellow, covered with numerous hairs. Leg I 3.64 long (1.00 + 0.28 + 0.93 + 0.83 + 0.60), leg IV 3.79 (1.03 + 0.30 + 0.95 + 0.98 + 0.53). Chaetotaxy 2.2.1.1. Length of spines 1-2 diameters of corresponding leg segment. Each metatarsus with a trichobothrium. TmI 0.78. Palp (Figs 21-25): Tibia with a large, claw-shaped prolateral outgrowth. Paracymbium relatively small, L-shaped, hooked apically. Tegulum subdistally with a keel-shaped outgrowth on ventral side, terminating with protegulum. Distal suprategular apophysis straight, narrow and relatively short. Median membrane reduced. Embolus short, straight and narrow. Radix small, flat and triangular. Abdomen 1.25 long, 0.75 wide, dorsal pattern as shown in Fig. 8.

Variation: The two paratypes have a different abdominal pattern: Fig. 8 cf. Fig. 9. In the holotype the pattern is similar to that in Fig. 9, but somewhat lighter. *Female.* Unknown.

Taxonomic remarks: See above under genus description.

Distribution: Known only from two nearby localities in West Java Province, Java, Indonesia.

Range: Javanese.

Parameioneta javaensis sp. nov.

Figs 26-31

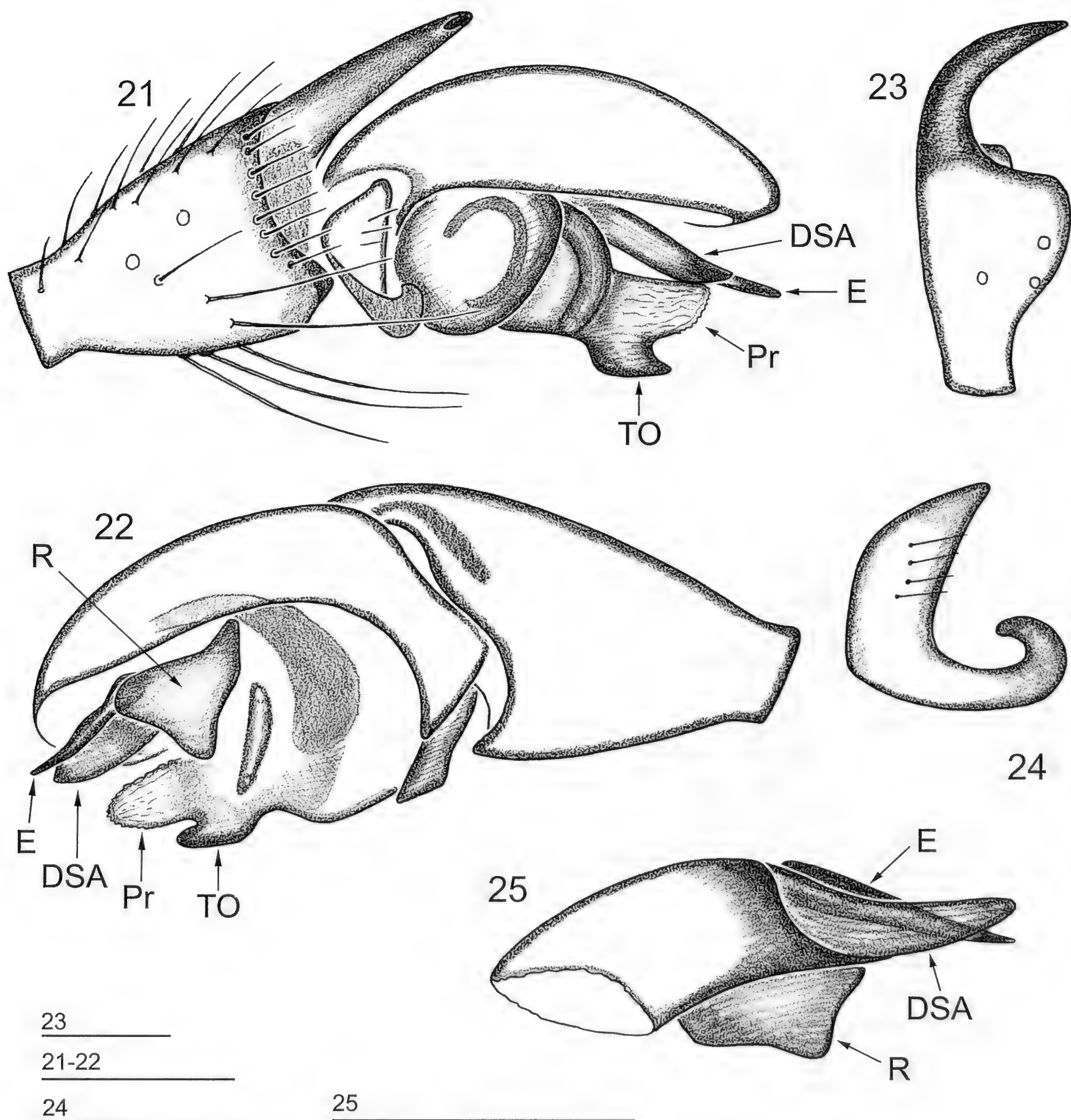
Holotype: MHNG; male [sample JB-89/02]; INDONESIA, Java, West Java Province, 8 km N of Bandung, Taman Hutan Raya Juanda (Forest Conservation Park), Winkler extraction; 13.X.1989; leg. J. Robert.

Etymology: The specific epithet is a name in apposition referring to the island where the types of this species were collected.

Diagnosis: The new species is well distinguished by the presence of a sharp, dorsal tooth on the palpal tibia, by the absence of a pit hook (after Saaristo, 1973) on the

distal suprategular apophysis, as well as by the specific shape of the paracymbium, lamella characteristica and embolus.

Description: *Male holotype.* Total length 1.40. Carapace unmodified, 0.65 long, 0.50 wide, greyish yellow. Eyes not enlarged, normal in size. Chelicerae 0.25 long, mastidion absent. Legs pale yellow. Leg I 2.04 long (0.53 + 0.18 + 0.53 + 0.50 + 0.30), leg IV 2.03 (0.55 + 0.13 + 0.50 + 0.50 + 0.35). Chaetotaxy 2.2.2.2. Length of spines 1-2 diameters of corresponding leg segment. Mt I-III with a trichobothrium each. TmI 0.21. Palp (Figs 26-31): Patella with a curved dorsal spine. Tibia with a small, sharp tooth dorsally. Paracymbium V-shaped, its distal



Figs 21-25. Details of male palp structure of *Javanyphia gede* sp. nov., paratype. (21-22) Right palp, retrolateral and prolateral views, respectively. (23) Palpal tibia, dorsal view. (24) Paracymbium, lateral view. (25) Distal suprategular apophysis and embolic division, ventro-lateral view.

part weakly sclerotized, almost transparent. Distal suprategular apophysis short and rounded, pit hook absent. Median membrane short and wide. Lamella characteristica long, widened distally and ending in two long, dark, stylet-shaped branches, upper branch with split apex. Terminal apophysis long, cylindrical, narrowing distally. Embolus with a long and narrow main body, embolus proper bifid terminally, branching off below apex of main body (Fig. 31). Abdomen 0.70 long, 0.45 wide, pale grey.

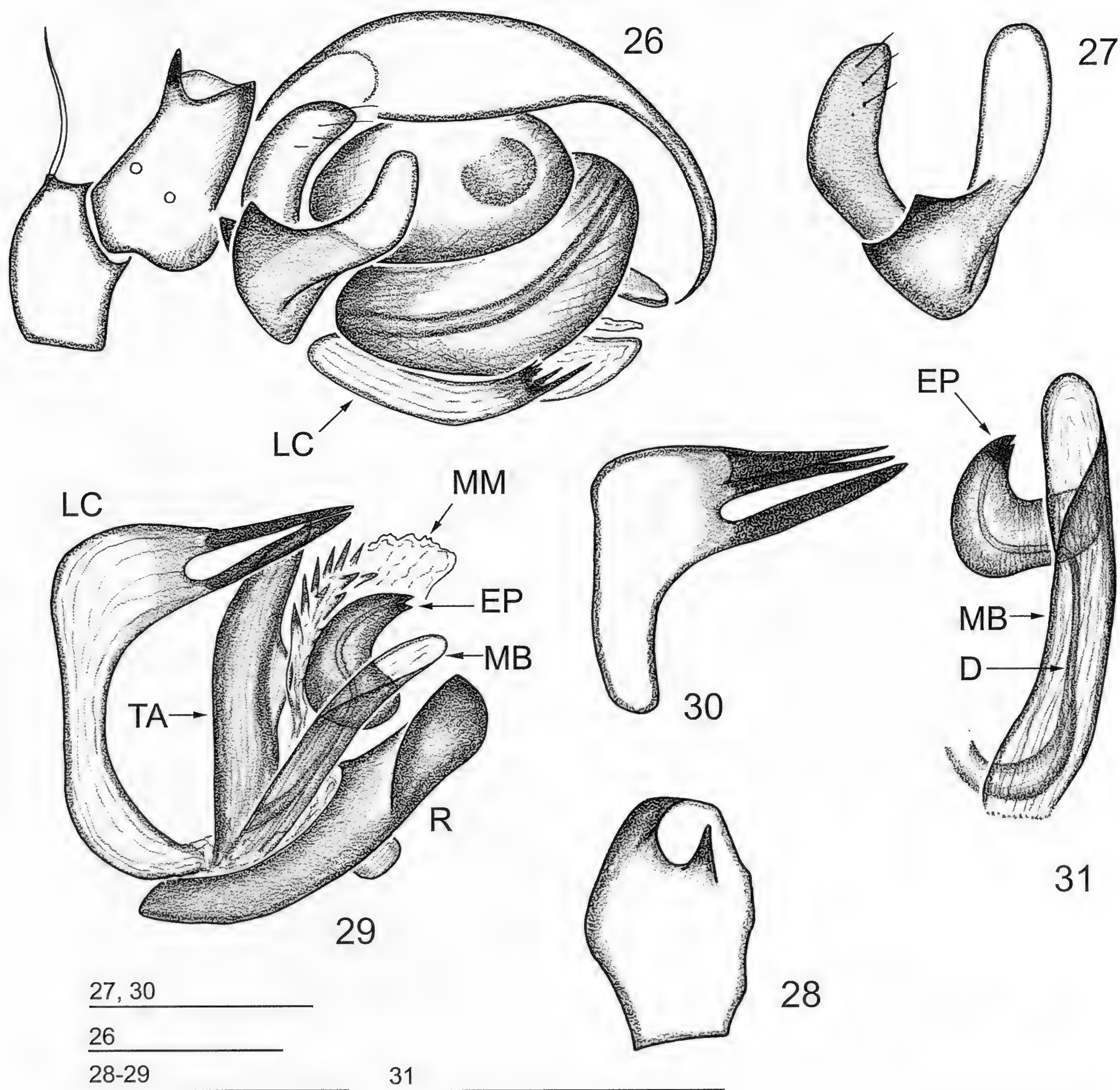
Female. Unknown.

Taxonomic remarks: The new species is similar to *Maorineta sulawesi* Tanasevitch, 2012, described from both sexes from Sulawesi, Indonesia (Tanasevitch & Stenchly, 2012). In the description the authors pointed out that *M. sulawesi* is clearly distinguished from

other known congeners. Indeed, the palp structure of *M. sulawesi* is quite different from that of other *Maorineta* Millidge, 1988, namely by the clearly differentiated sclerites in the embolic division, and this kind of conformation rather corresponds to *Parameioneta* Locket, 1982. Thus, I here transfer *M. sulawesi* to *Parameioneta*. *Parameioneta javaensis* sp. nov. clearly differs from *P. sulawesi* **comb. nov.** by a smaller dorsal tooth on the palpal tibia, by the absence of a pit hook, as well as by the shape of the lamella characteristica and of the embolus (Figs 30-31 cf. Tanasevitch & Stenchly, 2012: figs 11-13).

Distribution: Known only from the type locality on Java, Indonesia.

Range: Javanese.



Figs 26-31. Details of male palp structure of *Parameioneta javaensis* sp. nov. (26) Right palp, retrolateral view. (27) Paracymbium, lateral view. (28) Palpal tibia, dorsal view. (29) Embolic division, ventro-lateral view. (30) Lamella characteristica, ventro-lateral view. (31) Embolus, ventro-lateral view.

FAUNISTICS

Besides the four new species described above, the spider fauna of Java contains the 16 listed below.

Caviphantes pseudosaxetorum Wunderlich, 1979

Remarks: On Java this species is known from the Cibodas Botanical Garden (1400 m a.s.l.), West Java Province (Tanasevitch, 2019b).

Range: East Asian Palaearctic - Oriental.

Ceratinopsis orientalis Locket, 1982

Remarks: On Java this species is known from the environs of Cipanas, West Java Province (Tanasevitch, 2017a).

Range: Oriental.

Ketambea permixta Millidge & Russell-Smith, 1992

Remarks: Known only from a single female from Cibodas (1600 m a.s.l.), West Java Province, Indonesia (Millidge & Russell-Smith, 1992).

Range: Javanese.

Ketambea vermiformis Millidge & Russell-Smith, 1992

Remarks: Known from specimens of both sexes from Cibodas, West Java Province, Indonesia (Millidge & Russell-Smith, 1992).

Range: Javanese.

Metalepthyphantes kraepelini (Simon, 1905)

Material examined: MHNG; 1 female [sample AS-05/11]; INDONESIA, Java, West Java Province, Gunung Gede Pangrango National Park, near Cibodas, 6°47'0"S, 107°01'0"E, 1450-1600 m a.s.l.; 4.-11.V.2005; leg. A. Schulz.

Remarks: This species was originally described under *Bathyphantes* Menge, 1866 from a single female. Later the holotype was re-described and illustrated, and the species transferred to *Metalepthyphantes* Locket, 1968 by Helsdingen (1985b). Known only from West Java Province, Indonesia (Simon, 1905 and present new record).

Range: Javanese.

Mitrager noordami Helsdingen, 1985

Remarks: This species was described from specimens of both sexes from Central Java Province, Indonesia, as the type species of the genus *Mitrager* Helsdingen, 1985 (Helsdingen, 1985a). In its somatic and genitalic characters the genus is very similar to *Oedothorax* Bertkau, in Förster & Bertkau, 1883. This similarity is based on the same chaeto- and trichobothriotaxy, highly modified male carapace, the male palp conformation, notably by the shape of the embolus and the presence of a convector (named "lamella" by the author of the original description) in the embolic division. The epigyne structure also is very similar to that of *Oedothorax* representatives. The species is known only from the Dijeng Plateau (2580 m a.s.l.), Central Java Province, Indonesia (Helsdingen, 1985a).

Range: Javanese.

Nasoonasocialis (Wunderlich, 1974)

Walckenaeria caobangensis Tu & Li, 2004, **syn. nov.**

For other synonyms and combinations see World Spider Catalog (2019).

Remarks: *Nasoonasocialis* was described from a female from the Nepal Himalayas and originally placed in *Oedothorax* (Wunderlich, 1974). Later this species was described for a second time from a single male as *Gorbothorax ungi* Tanasevitch, 1998 from the same mountain region (Tanasevitch, 1998). The species is widely distributed in the Oriental Region: China, Nepal, India, Myanmar, Laos, Thailand, Malaysia (mainland), Indonesia (Bali, Java) (World Spider Catalog, 2019). *Walckenaeria caobangensis* was described on the basis of a female from Cao Bang Province, northern Vietnam (Tu & Li, 2004). The original description and figures of carapace, epigyne and vulva clearly show that *W. caobangensis* is conspecific with *Nasoonasocialis* and therefore a junior synonym. The synonymy is indirectly supported by the fact that *N. asocialis* is known from Xishuangbanna, southern China (Zhao & Li, 2014) and from northern Laos (Tanasevitch, 2014), territories close to the type locality of *W. caobangensis*. The species is known on Java from the Ijen Mts, 950 m a.s.l. (Tanasevitch, 2017a).

Range: Oriental.

Nematogmus dentimanus Simon, 1886

Remarks: On Java this species is known from Buitenzorg (= Bogor), West Java Province (Helsdingen, 1979).

Range: Oriental.

Nerienne amiculata (Simon, 1905)

Remarks: This species was described under *Linyphia* Latreille, 1804 from specimens of both sexes from Cibodas (= Tjibodas), West Java Province, Indonesia (Simon, 1905). Later the types were re-described and the species transferred to *Nerienne* Blackwall, 1833 by Helsdingen (1969). Known only from Java so far.

Range: Javanese.

Nerienne macella (Thorell, 1898)

Remarks: On Java this species is known from the Cibodas Botanical Garden (1250-1300 m a.s.l.) (Tanasevitch, 2017a).

Range: Oriental.

Nerienne sundaica (Simon, 1905)

Remarks: This species was described under *Linyphia* from a single female from Lombok, Indonesia and from a single male from Cibodas (= Tjibodas), West Java Province, Indonesia (Simon, 1905). Later the types were re-described and the species transferred to *Nerienne* by Helsdingen (1969).

Range: South Indonesian.

Oedothorax bifoveatus Tanasevitch, 2017

Remarks: On Java this species is known from the Cibodas Botanical Garden (1400 m a.s.l.) and from the environs of Cibodas (1450-1600 m a.s.l.) (Tanasevitch, 2017b).

Range: Oriental.

Ostearius melanopygius
(O. Pickard-Cambridge, 1880)

Remarks: On Java this species is known from the Cibodas Botanical Garden (1320 m a.s.l.) (Tanasevitch, 2019b).

Range: Cosmopolitan.

Piesocalus javanus Simon, 1894

Remarks: This species is known only from a single female from Palabouan, Java (Simon, 1894; Jocqué, 1983).

Range: Javanese.

Racata grata Millidge, 1995

Remarks: On Java this species is known from the environs of Cibodas, West Java Province (Tanasevitch, 2019a).

Range: South Indonesian.

Solenysa sp.

Material: MHNG; 1 male [sample AS-05/11]; INDONESIA, Java, West Java Province, Gunung Gede Pangrango National Park, near Cibodas, 6°47'0"S, 107°01'0"E, 1450-1600 m a.s.l.; 4.-11.V.2005; leg. A. Schulz.

Remarks: This species is a probably new and similar to Palaearctic congeners. It is characterized by a long, ribbon-shaped, distally darkened radical apophysis. The shape and the position of this sclerite strongly resembles the micronetine's lamella characteristic and it was incorrectly named so by authors who described species in this genus, e.g. Tu & Li (2006), Tu & Hormiga (2011), Wang *et al.* (2015), etc.

Range: Javanese.

DISCUSSION

The linyphiid spider fauna of Java is presently known to contain 20 species, 13 of them are Erigoninae, five species are Linyphiinae and two are Micronetinae. The placement of two Javanese species described under *Ketambea* Millidge & Russell-Smith, 1992 in the subfamily Linyphiinae is doubtful. The authors pointed out that based on the structure of the embolic division *Ketambea* is very similar to the Neotropical *Dubiaranea* Mello-Leitão, 1943 (see Millidge & Russell-Smith, 1992), the type genus of the subfamily Dubiaraneinae. However, the epigyne of *Ketambea* is of the Linyphiinae type, and Millidge & Russell-Smith (1992) listed it in the Linyphiinae, noting that the genus "should probably be regarded as forming part of the Linyphiinae (sensu stricto), despite the absence of the genital socket." My opinion on the subfamily placement of the genera mentioned above is briefly given in Tanasevitch (2019a).

Among the 20 known linyphiid species from Java, eleven species were described from the island and since they have never been recorded from anywhere else. There are: *Javagone maribaya* sp. nov., *Javanaria gracilipes* sp. nov., *Javanophia gede* sp. nov., *Ketambea permixta*, *K. vermiformis*, *Metalepthyphantes kraepelini*, *Mitrager noordami*, *Nerienne amiculata*, *Piesocalus javanus*, *Parameioneta javaensis* sp. nov., and *Solenysa* sp. Nevertheless these species should not yet to be considered as endemics since the fauna of Southeast Asia is still insufficiently studied. Three species, *Nerienne*

sundaica, *Oedothorax bifoveatus* and *Racata grata*, were also recorded from neighboring islands: Lombok, Borneo and Krakatoa, respectively. Three species, *Ceratinopsis orientalis*, *Nasoona asocialis* and *Nematogmus dentimanus*, are widely distributed in the Indo-Malayan Region, and have an Oriental range. One species, *Ostearius melanopygius*, is a cosmopolitan which is known from all regions except for the Neotropics.

Today we can characterize the Javanese linyphiid spider fauna as Oriental, with weak relations to the East Asian Palaearctic fauna, and without any yet recognizable relations to the rich linyphiid fauna of the neighboring Australian Region.

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A second species of the family Eutrachytidae (Acari: Uropodina) in Africa: *Mahnertellina paradoxa* gen. nov., sp. nov. from the Ivory Coast

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Abstract: The second African species of the family Eutrachytidae is discovered and described as *Mahnertellina paradoxa* gen. nov., sp. nov. on the basis of two females from the Ivory Coast. The new genus is similar to *Dicornutophorus* Hirschmann, 1979, but the marginal shield of the new genus is reduced and the pygidial shield is absent, whereas in *Dicornutophorus* the marginal shield is complete and the pygidial shield is present.

Keywords: Taxonomy - new taxa - West-Africa.

INTRODUCTION

The family Eutrachytidae is a widely distributed group of Uropodina mites (Wiśniewski, 1993). The majority of its species occurs in the Neotropical and Oriental regions, but some species have also been reported from the Palearctic, and one species from Africa (Wiśniewski, 1993). So far only *Deraiphorus endrodyi* Hirschmann, 1973 is known from that continent, having been collected in Ghana, West Africa.

With more than 50 described and named species the systematics of this family is poorly known. Moraza *et al.* (2016) mentioned that this family is missing from the comprehensive “Manual of Acarology” (Lindquist *et al.*, 2009). In the same work the Eutrachytidae are presented as a single family which contains all the known “eutrachytid” and “deraiphorid” mites separated into eight genera (Moraza *et al.*, 2016).

During my visits to the Natural History Museum of Geneva numerous soil samples from Africa were investigated, and one sample from Ivory Coast contained two unusual specimens of eutrachytid mites which are described herein as a new genus.

MATERIAL AND METHODS

The two specimens examined were cleared in lactic acid for a week and subsequently investigated on half-covered slides with a well under a Leica 1000 microscope. Legs and chelicerae are not described in detail, because they provide very little relevant taxonomic information in Uropodina. Moreover, a detailed study of the chelicera

would necessitate breaking the specimens, which, in the case of type specimens, I wanted to avoid. The drawings were made with the aid of a drawing tube on a Leica 1000 microscope; the photos were taken by a KEYENCE VHX-5000 digital microscope with a 20-200× objective (Keyence Co., Osaka, Japan). Both specimens are stored in ethanol and deposited in the Natural History Museum in Geneva. Abbreviations: *h* = hypostomal setae, *st* = sternal setae, *ad* = adanal setae, *lf* = lyriform fissures, *p* = gland pores; *JV* and *ZV* are ventral setae. All measurements and the scales in the figures are given in micrometres (µm).

SYSTEMATICS

Family Eutrachytidae Trägårdh, 1944

Mahnertellina gen. nov.

Type species: *Mahnertellina paradoxa* sp. nov.

Diagnosis: Idiosoma yellowish brown, shape triangular, with a pair of long posterior processes. Marginal shield of dorsal idiosoma reduced at level of posterior processes. Peritremes long, anterior part of prestigmatid section of peritremes with some bends. Genital shield of female scutiform. Internal malae on gnathosoma pilose, setae *h1* smooth, other setae on gnathosoma serrate. Setae *v1* on palp trochanter situated on a long ventral and apically curved process. Adanal setae long and robust.

Etymology: The new genus is dedicated to Professor Volker Mahnert (1943-2018), an excellent pseudoscorpion specialist and a former director of the Natural History Museum in Geneva (Schwendinger, 2019). The gender of the new genus name is feminine.

Notes: Up to now only one genus of the family Eutrachytidae is characterized by long posterior processes of the idiosoma: the genus *Dicornutophorus* Hirschmann, 1979. This genus possesses a pygidial shield and the marginal shield is complete. These two structures are absent in the new genus. The *vl* setae on the palp trochanter of previously described eutrachytid mites is situated on the surface of the trochanter, whereas in the new genus this seta is placed on a long and apically curved process. All previously collected

specimens of the genus *Dicornutophorus* are from the Neotropical region (Bolivia and Brazil; Wiśniewski, 1993), whereas specimens of the new genus and species were found in West Africa.

Zoogeographical note: Till today the African eutrachytids are mostly unknown. The discovery of a second species of this family in Africa indicates that additional closely related species live in the soils of the West African rain forests.

***Mahnertellina paradoxa* sp. nov.**

Figs 1-16

Specimens examined: MHNG; female holotype and 1 female paratype; "Afrique Occidentale: Côte d'Ivoire,

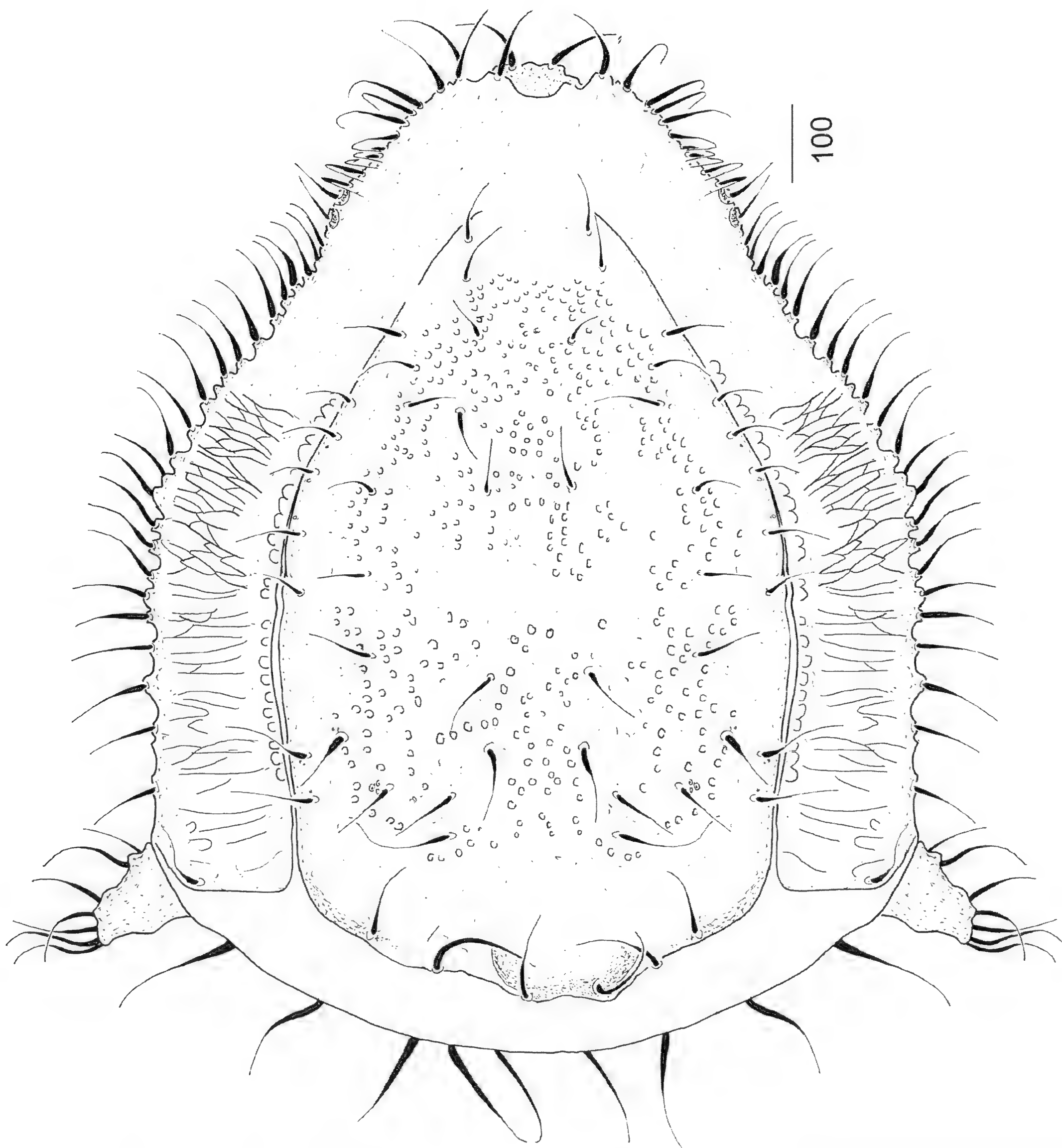


Fig. 1. *Mahnertellina paradoxa* gen. nov., sp. nov., dorsal side of idiosoma of female holotype.

forêt de Tai, environs de la station, tamisage de bois mort"; 20 October 1980; leg. V. Mahnert and J.L. Perret.

Etymology: The epithet, an adjective, refers to the unusual character states of the new species.

Diagnosis: Same as for the genus.

Description of female: *Dorsal idiosoma* (Figs 1, 13-15). Idiosoma yellowish brown, triangular, with two posterior processes, 1290-1300 long and 715-720 wide ($n=2$), all setae on dorsal idiosoma smooth and needle-like. A pair of robust (110-115 long and 60-70 wide) idiosomal processes situated on posterolateral margin of body, these bearing six to seven 100-105 long setae (Fig. 4). Dorsal and marginal shields completely fused in anterior area. Dorsal shield covered by small (8×7) oval pits almost on whole surface except for narrow strips close to its lateral margins. Dorsal shield with

24-25 pairs of dorsal setae, these about 95-110 long and associated with gland pores (Fig. 5). Caudal area of dorsal shield with an elevated, rounded area bearing a pair of about 105-108 long setae. Two pairs of setae (about 103-108 long) situated on caudal margin of dorsal shield lateral to the elevated area. Marginal shields reduced at level of posterolateral processes, with reticulate sculptural pattern (Fig. 3). Thirty-nine to forty pairs of about 107-115 long setae presented on marginal shields and situated on small protuberances. Pygidial region unsclerotized, with soft membranous integument, lacking scutal elements.

Ventral idiosoma (Figs 2, 16). Base of tritosternum narrow, with two anterolateral humps; tritosternal lacinia three-tined, lateral tines each with a small medial spine and pointed, central tine slightly longer and smooth (Fig. 6). Sternal shield with two anterior incisions and without sculptural pattern. Sternal setae *st1-st3* minute

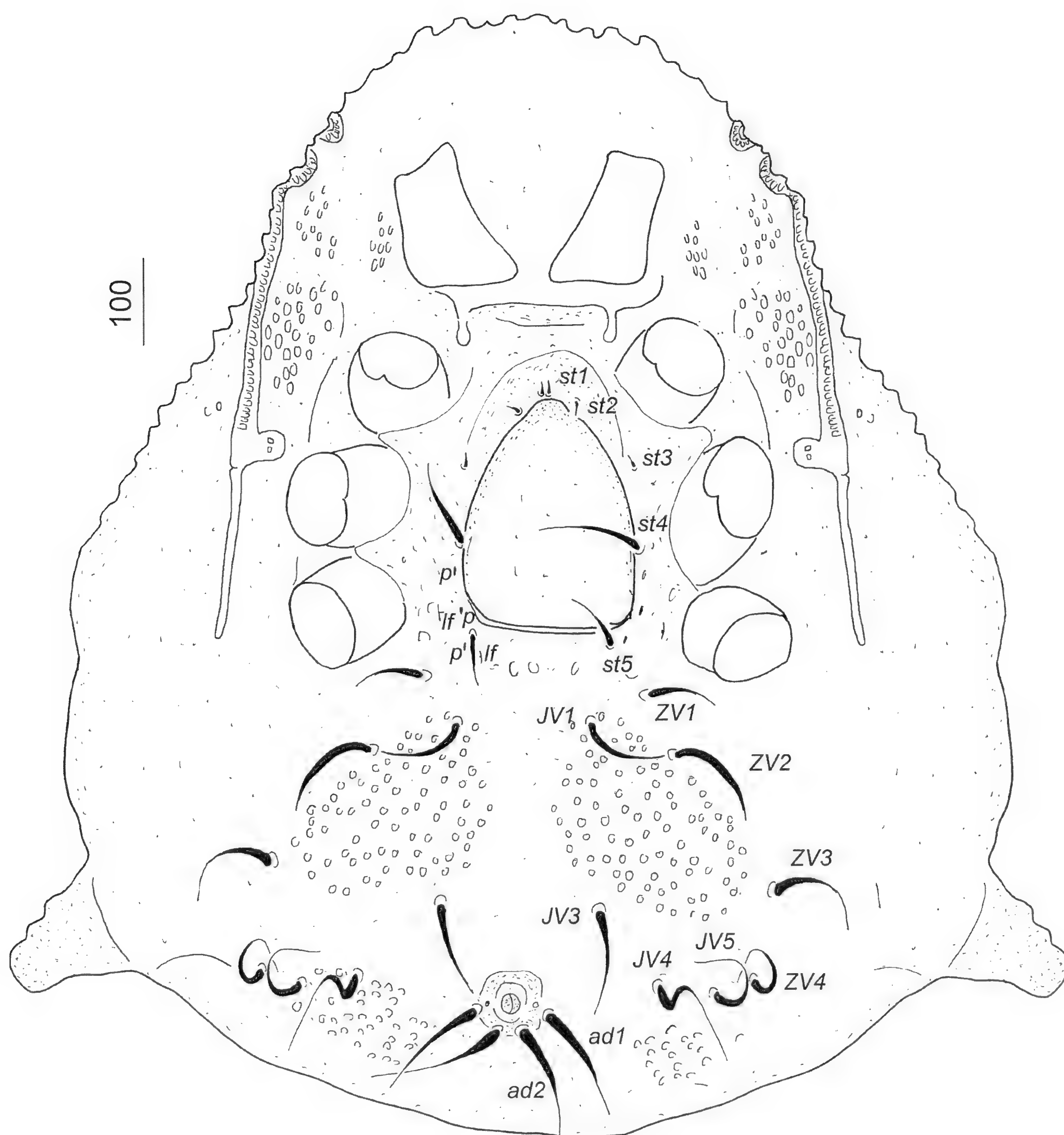
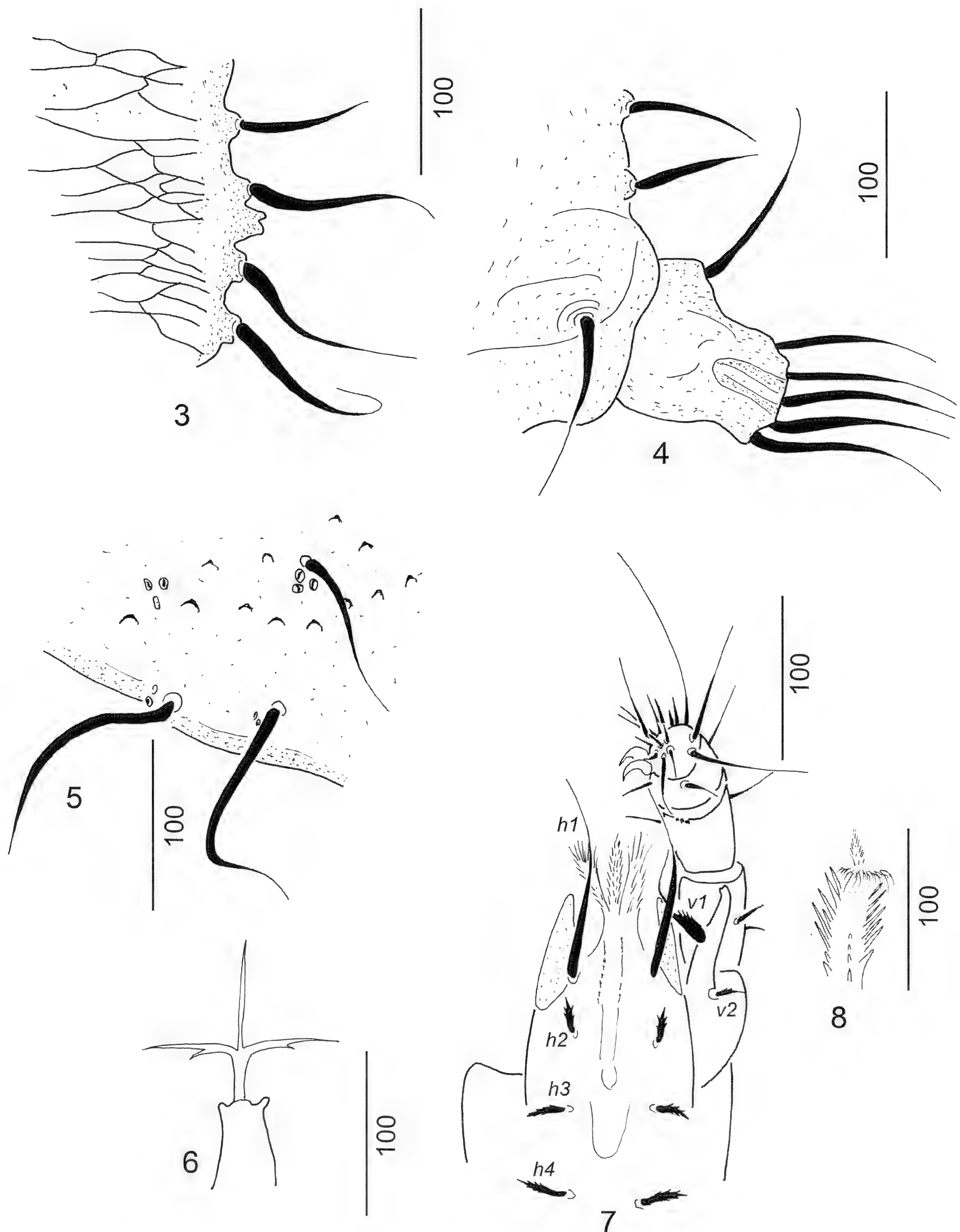


Fig. 2. *Mahnertellina paradoxa* gen. nov., sp. nov., ventral side of idiosoma of female holotype.

(about 13-17), *st4* (about 114-120) and *st5* (about 60-70) longer. All sternal setae smooth and needle-like. Setae *st1* situated close to each other and close to anterior margin of genital shield, *st2* close to *st1*, *st3* at level of anterior margin of coxae III, *st4* at level of anterior

margin of coxae IV, and *st5* close to posterior edge of genital shield. Two pairs of lyriform fissures and three pairs of gland pores situated around *st5*. One pair of large fields of oval pits situated posterior to coxae IV, and another pair of large fields of oval pits visible lateral to

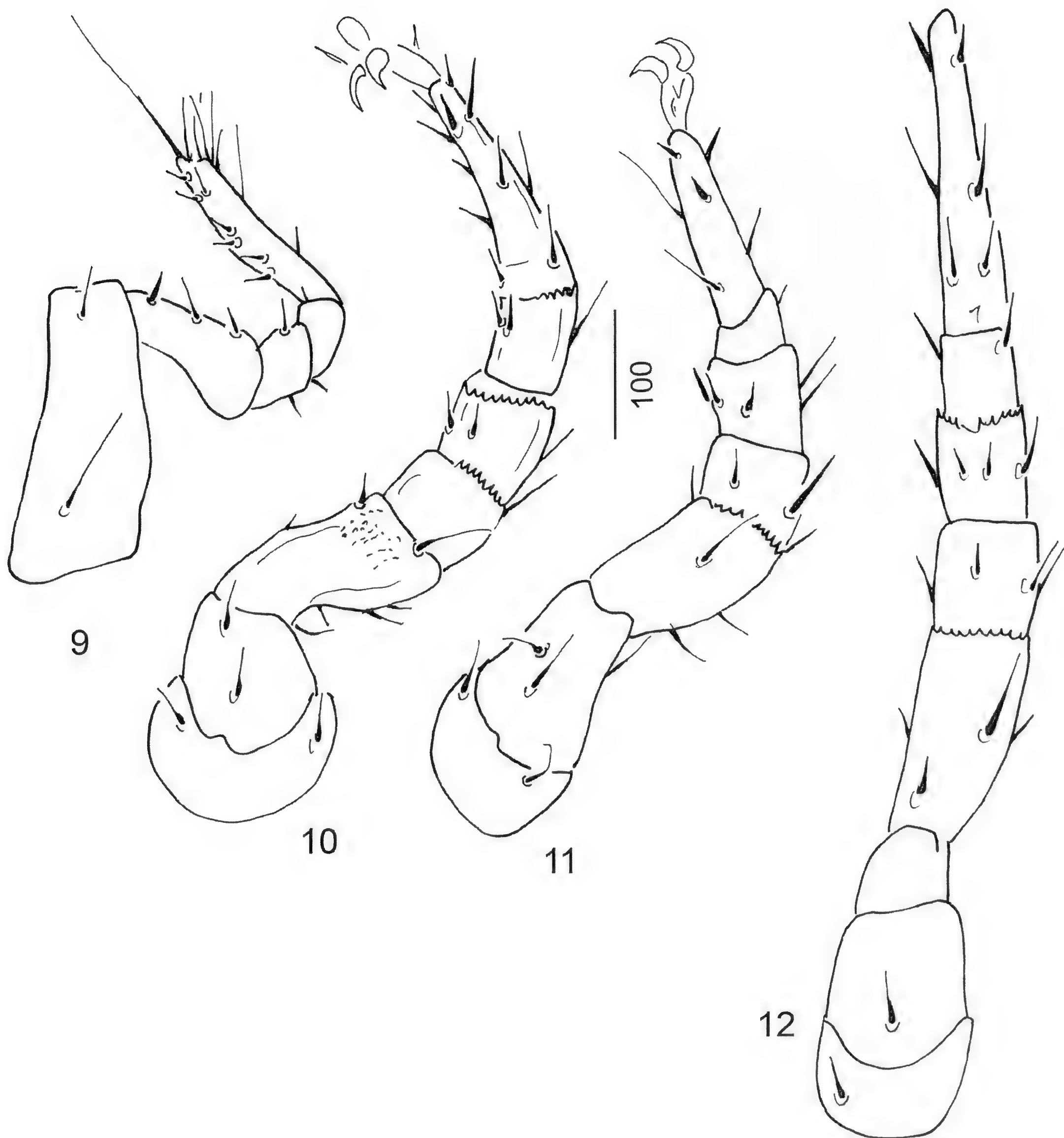


Figs 3-8. *Mahnertellina paradoxa* gen. nov., sp. nov., female holotype. (3) Setae and sculptural pattern on marginal shield. (4) Area of posterior idiosomal process. (5) Setae and ornamentation on caudal area of dorsal shield. (6) Tritosternum. (7) Ventral side of gnathosoma with palp. (8) Epistome.

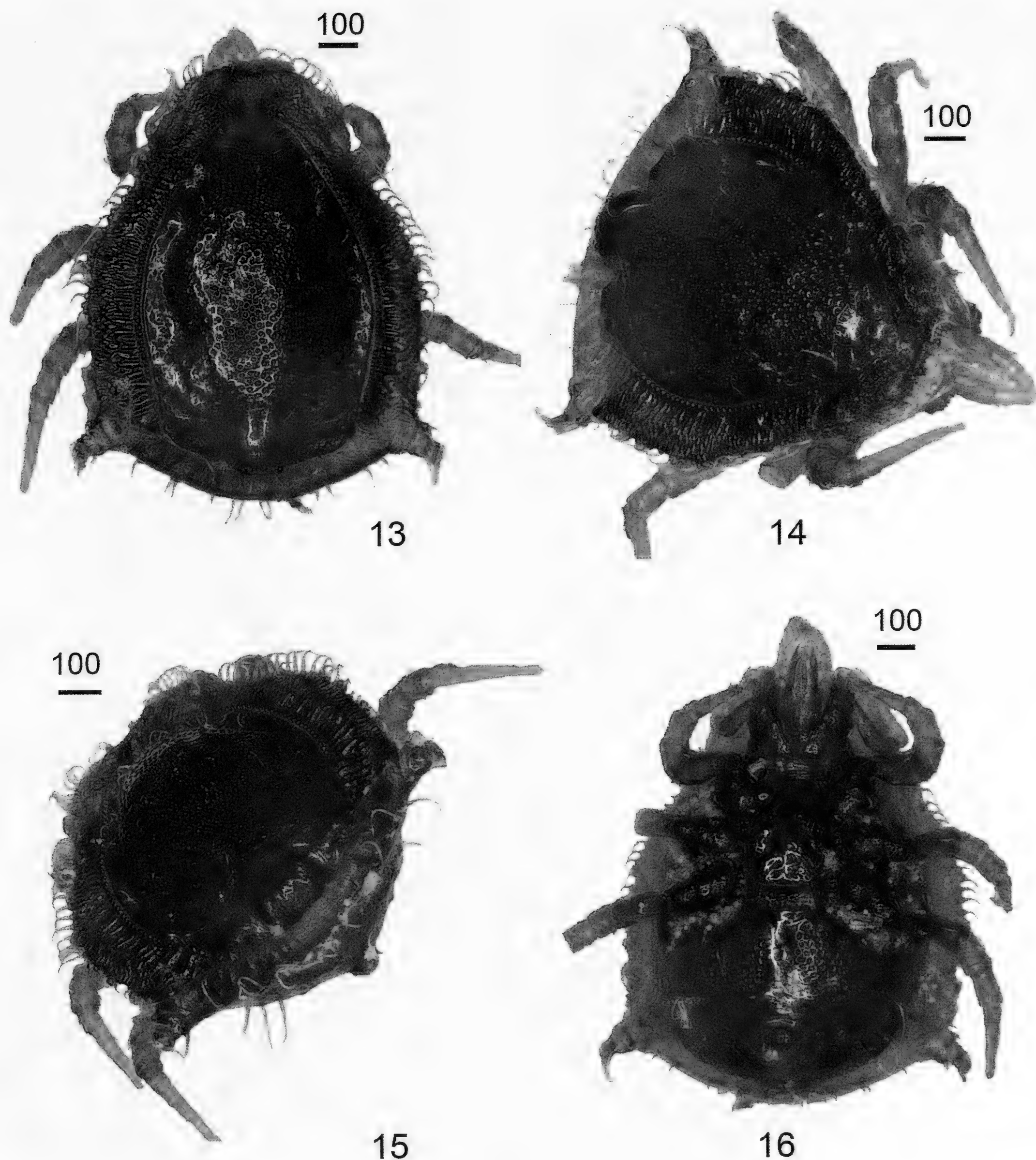
anal opening on ventral shield. Eight pairs of smooth and long (about 95-130) ventral setae in three groups situated on ventral shield. Three pairs of setae (*JV1*, *ZV1*, *ZV2*) placed anterior to first fields of oval pits, two pairs (*JV3*, *ZV3*) posterior to these fields, three pairs (*JV4*, *JV5*, *ZV4*) of strongly curved setae present lateral to anal opening. Anal opening very small (about 20-24×19-22), two pairs of long (about 135-145), smooth and needle-like adanal setae present; postanal seta absent. Genital shield about 245-250 long and about 180-185 wide, scutiform, its anterior margin straight, not pointed as in other eutrachytid mites, its surface smooth. Tracheal stigmata situated between coxae II and III; prestigmatic section of peritremes long, with two anterior bends, poststigmatic part short and straight. Leg grooves (pedofossae) absent.

Gnathosoma (Fig. 7). Corniculi horn-like, internal malae markedly longer than corniculi and apically pilose. Hypostomal setae *h1* long (about 135-140 in length), smooth and needle-like; *h2*, *h3* and *h4* shorter (about 22-33) and marginally serrate. Setae *v1* on palp trochanter robust, serrate and situated on a long and apically curved process. Setae *v2* on palp trochanter marginally serrate, other setae on palp smooth. Epistome apically pilose and densely serrate (Fig. 8). Fixed digit of chelicerae longer than movable digit, other details not visible without breaking the type specimens.

Legs (Figs 9-12). Legs I 570-585 long, legs II 685-690, legs III 645-655, legs IV 900-910. Legs I without tarsal claws. Leg setae mostly smooth and needle-like.



Figs 9-12. *Mahnertellina paradoxa* gen. nov., sp. nov., legs of female holotype in ventral view. (9) Leg I. (10) Leg II. (11) Leg III. (12) Leg IV.



Figs 13-16. Photos of *Mahnertellina paradoxa* gen. nov., sp. nov., female holotype. (13) Dorsal view of idiosoma. (14) Anterior view of dorsal side of idiosoma. (15) Caudal view of dorsal side of idiosoma. (16) Ventral view of idiosoma.

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A new species of *Syrroiulus* Verhoeff, 1914 from Iran, with remarks on the taxonomy of the genus (Diplopoda: Julida: Julidae)

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Abstract: *Syrroiulus lohmanderi* sp. nov. is described from material collected in Gilan Province, northwestern Iran. The new species is morphologically most similar to *S. astrabadensis* (Lohmander, 1932a) and *S. persicus* (Golovatch, 1983), also known only from the northern parts of Iran. A key to the species of *Syrroiulus* Verhoeff, 1914 recorded from this country is compiled, and a checklist of all species presently assigned to the genus is given. *Syrroiulus adsharicus* (Lohmander, 1936) and *S. cappadocius* (Lohmander, 1939) are transferred from *Amblyiulus* Silvestri, 1896. The taxonomic problems within *Syrroiulus* and related genera are briefly discussed.

Keywords: Taxonomy - millipedes - Pachyiulini - identification key - distribution - Alborz Mts.

INTRODUCTION

Syrroiulus Verhoeff, 1914 is one of the 16-22 recognized genera and/or subgenera currently comprising the julid tribe Pachyiulini (Tabacaru, 1978; Golovatch, 1979; Mauriès, 1982; Enghoff, 1992; Mauriès *et al.*, 1997). It belongs to a group of genera, along with *Afropachyiulus* Schubart, 1960, *Amblyiulus* Silvestri, 1896, *Dolichoiulus* Verhoeff, 1901, and *Japanoiulus* Verhoeff, 1937, characterized by a (mostly) spoon-shaped promere with one or two apical denticles/ridges, by the presence of a well differentiated mesomeral process, and by the solenomere being devoid of either fovea or pseudofovea, as well as of a pseudoflagellum (see also Enghoff, 1992). The delimitations of these five genera have been highly problematic, particularly because they [with the exception of *Dolichoiulus* which was thoroughly revised by Enghoff (1992)] have never been properly diagnosed, partly due to their rather simple and uniform gonopod morphology that is typical of Pachyiulini in general (see e.g. Enghoff, 1992; Frederiksen *et al.*, 2012; Vagalinski *et al.*, 2014).

Originally proposed as a subgenus of *Dolichoiulus*, *Syrroiulus* was mostly disregarded by subsequent authors dealing with Pachyiulini (Attems, 1926; Lohmander, 1932a, b, 1936; Tabacaru, 1978; see also Golovatch, 2018) until Mauriès (1982) synonymized the genera and subgenera *Caspiopachyiulus* Lohmander, 1932a, *Elbaiulus* Verhoeff, 1930, *Heteropachyiulus* Lohmander,

1936, *Iudaeoiulus* Verhoeff, 1930, and *Japanoiulus* Verhoeff, 1937 under *Syrroiulus*, recognizing a total of 15-16 species within the redefined genus. Two years later the same author added a new species from Greece to the list of congeners (Mauriès, 1984). In his checklist of the Diplopoda of Israel Tabacaru (1995), unlike Mauriès (1982), treated *Syrroiulus aharonii* under *Amblyiulus*, most likely remaining consistent with an earlier study by himself (Tabacaru, 1978) on Pachyiulini systematics in which he regarded *Syrroiulus* as a synonym of *Amblyiulus*. The latest treatment of *Syrroiulus* is that of Golovatch (2018) in the framework of a review of the Israeli Pachyiulini (referred to as subfamily Pachyiulinae). In that paper the author emphasized the importance of the solenomere structure for the differentiation between *Syrroiulus* and *Amblyiulus*, specifically of the presence in the latter genus of a slender, rod-like mesal process which is absent in *Syrroiulus*. Golovatch (2018) clearly illustrated the existence of such a process in *Syrroiulus cedrophilus* (Attems, 1911) [(as referred to by Mauriès (1982)], which was the reason why he transferred that species back to *Amblyiulus*.

Here I describe a new species of *Syrroiulus* from the Caspian region of Iran, using the occasion to sort out taxonomic problems concerning the genus, in an attempt to add some clarity to its systematic affinities and species composition.

MATERIAL AND METHODS

A MBS-10 stereomicroscope was used for general examinations and measurements. Whole body pictures of type specimens were prepared from multilayer photographs made under a Carl Zeiss Discovery V8 stereo microscope with a Nikon Coolpix S3700 camera mounted on one of the eyepieces, followed by focal stacking in Photoshop CC 2019. Certain body parts (legs, antennae, penis, edge of male body ring 7, gonopods, and vulva) were dissected and mounted in glycerin on temporary slides. They were then examined and photographed with the aid of a ProgRes C7 camera connected to a Zeiss Axio Imager 2 compound microscope. Some of the pictures were used for making drawings on tracing paper from a laptop display. SEM micrographs of one posterior gonopod were taken with a JEOL JSM-5510 scanning electron microscope after mounting on a sticky aluminum tape and sputter-coating with gold.

The description of the new species mostly follows the pattern used in Vagalinski & Lazányi (2018) and Vagalinski & Golovatch (2019). Terminology of the gonopod structures is mostly after Enghoff (1992), with the following differences: “promere” is used instead of “promerite”, “mesomeral process” instead of “mesomerite”, “opisthomere” instead of “opisthome-rite”, “caudomesal lamella” instead of “membrane”, and “mesal ridge” and “anterior process” are here interpreted as parts of the anterior lamella of the solenomere.

The examined samples are deposited in the Muséum d’histoire naturelle, Genève, Switzerland (MHNG) and in the Göteborg Naturhistoriska Museet, Göteborg, Sweden (GNM).

TAXONOMIC PART

Genus *Syrroiulus* Verhoeff, 1914

Syrroiulus Verhoeff, 1914: 65 (established as a subgenus of *Dolichoiulus*).

Type species: *Dolichoiulus polyzonus* Attems, 1911, by subsequent designation by Jeekel (1970).

Tentative diagnosis: A genus of the tribe Pachyiulini characterized by a (more or less distinctly) spoon-shaped promere with two apical denticles, and with an opisthomere deeply divided into a mesomeral and a solenomeral branch, the latter lacking fovea or pseudofovea and pseudoflagellum. Different from the similar genera *Afropachyiulus*, *Amblyiulus*, *Dolichoiulus*, and *Japanoiulus* mostly by a typically (but not always) weakly pronounced anterior lamella of the solenomere, apically never drawn into a distinct process, and by the solenomere apex being blunt or concave, sometimes bearing minute apical processes or ciliae, but not tapering into a single, pointed tip.

Syrroiulus lohmanderi sp. nov.

Figs 1-16

Material: MNHG; male holotype (fragmented into head, rings 1-6, left part of ring 7 and rest of body; gonopods, left antenna, leg-pair 1, leg-pair 2, penis, right leg 3, right edge of ring 7, and left mid-body leg dissected; left opisthomere prepared for SEM), sample field number 7314; label “Iran (Gilan), Siahkal, tamis., mousse, creux gros arbres” [Iran, Gilan Province, Siahkal, sifting, moss, old, hollow trees]; 06.JUL.1973; leg. A. Senglet. – MNHG; 1 adult female paratype (fragmented into head to ring 3 and rest of body; right vulva dissected); 1 juvenile female paratype (unbroken); same collecting data as holotype.

Type locality: Iran, Gilan Province, Siahkal.

Etymology: Named in memory of Hans Lohmander (1896-1961), a prominent millipede taxonomist who described six species currently assigned to *Syrroiulus*.

Diagnosis: A blind species of *Syrroiulus*, particularly similar to *S. astrabadensis* (Lohmander, 1932a) and *S. persicus* (Golovatch, 1983) in gonopod and vulva structure. Different from *S. astrabadensis* mostly by its larger size and darker colouration, and by mesomeral process being subequal to rather than significantly shorter than solenomere. Different from *S. persicus* by absence of metazonal setae, and by presence of typical, pointed mesal apical denticle of promere (the same being a rounded lobe in the latter species).

Description

Measurements: Holotype with 60+1+T body rings, length 29 mm, mid-body vertical diameter 1.65 mm. Adult female paratype with 59+1+T body rings, length 28 mm, mid-body vertical diameter 1.9 mm. Juvenile female paratype with 49+4+T body rings.

Colouration (after more than 40 years of ethanol preservation) (Figs 1-4): Mostly ochre brown, prozonae greyish with purple tinges; head with a dark, blurred, oval spot mesally to each antenna, and with a dark, narrow, axial line on vertex; body without axial line; legs and antennae light yellow to completely pallid; pre-anal ring and paraprocts darker ventrally.

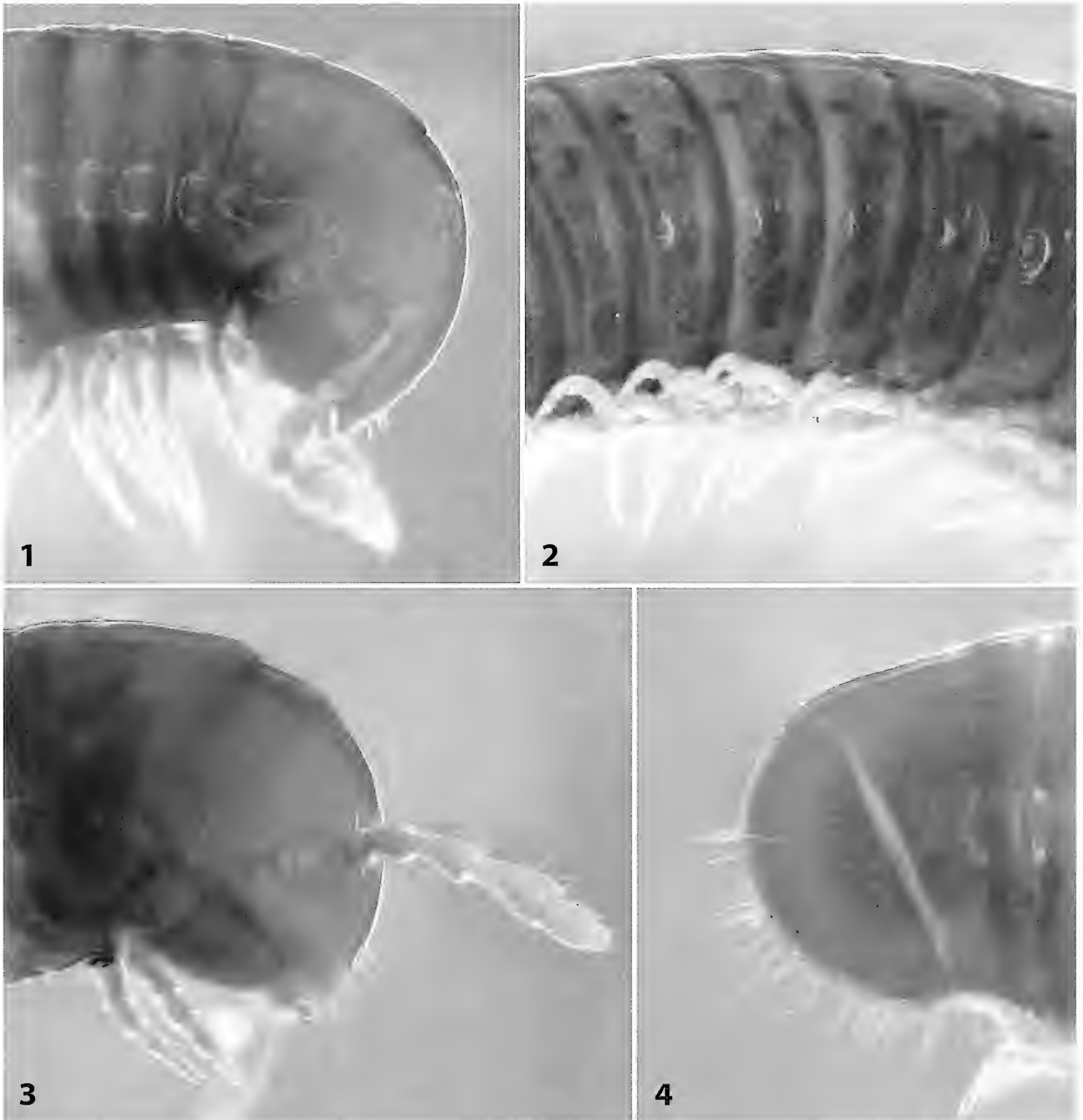
General morphology (Figs 1-4, 5): Ommatidia absent; vertigial setae absent; 5 supralabral setae in the adult specimens, and 4 in the juvenile; 20-26 labral setae. Antennae (Fig. 5) about 1.2 times as long as head in both sexes; antennomeres 3, 4, and 5 subequal in length, about 0.8 times as long as 2, and 1.5 times as long as 6, 5 considerably thicker than 6; a whorl of sensilla basiconica at distal margins of antennomeres 5 and 6, those on 5 nearly as long as the four apical cones, somewhat longer than those on 6. Gnathochilarium of normal julid appearance; promentum relatively short; considerably less than half the length of lingual lamellae; each lingual lamella bearing 4-5 setae. Collum smooth,

some specimens with one to several very shallow grooves near posterolateral corners.

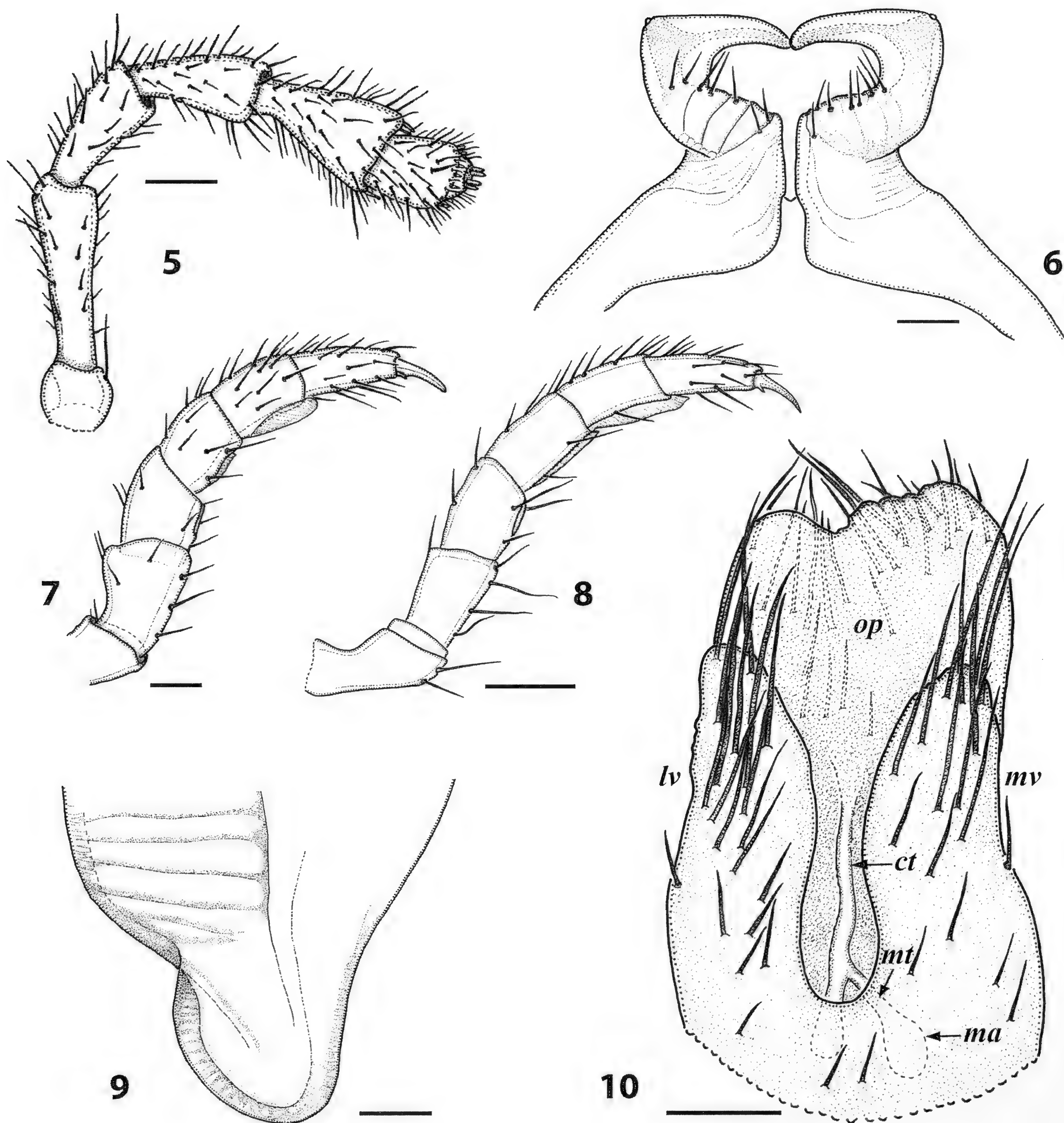
Prozonae with very short and shallow, scattered, longitudinal striae. Metazonae rather shallowly and somewhat irregularly striated, with 5-8 striae in a square with sides equal to metazonal length just below ozopore level; hind margins slightly turned outwards, bearing no setae. Ozopores set in metazonae, at $1/4$ - $1/3$ of metazonal length behind pro-metazonal suture; the latter indistinct,

especially on dorsal side, recognizable only as a barely visible concentric groove running through middle of ring. Mid-body legs 1.55 and 0.95 times as long as mid-body diameter in the adult male and in the adult female, respectively. Tarsus of mid-body legs 1.2-1.3 times as long as tibia, and about 3 times as long as apical claw.

Telson (Fig. 4): Pre-anal ring dorsally with a few short setae; epiproct absent; hypoproct short and broadly rounded, tightly fitting under paraprocts in both sexes,



Figs 1-4. *Syrroiulus lohmanderi* sp. nov., overall appearance of male holotype (1, 2, 4) and female paratype (3), in MHNG. (1) Head and body rings 1-5. (2) Mid-body rings. (3) Head and collum. (4) Telson. Photos not to scale.



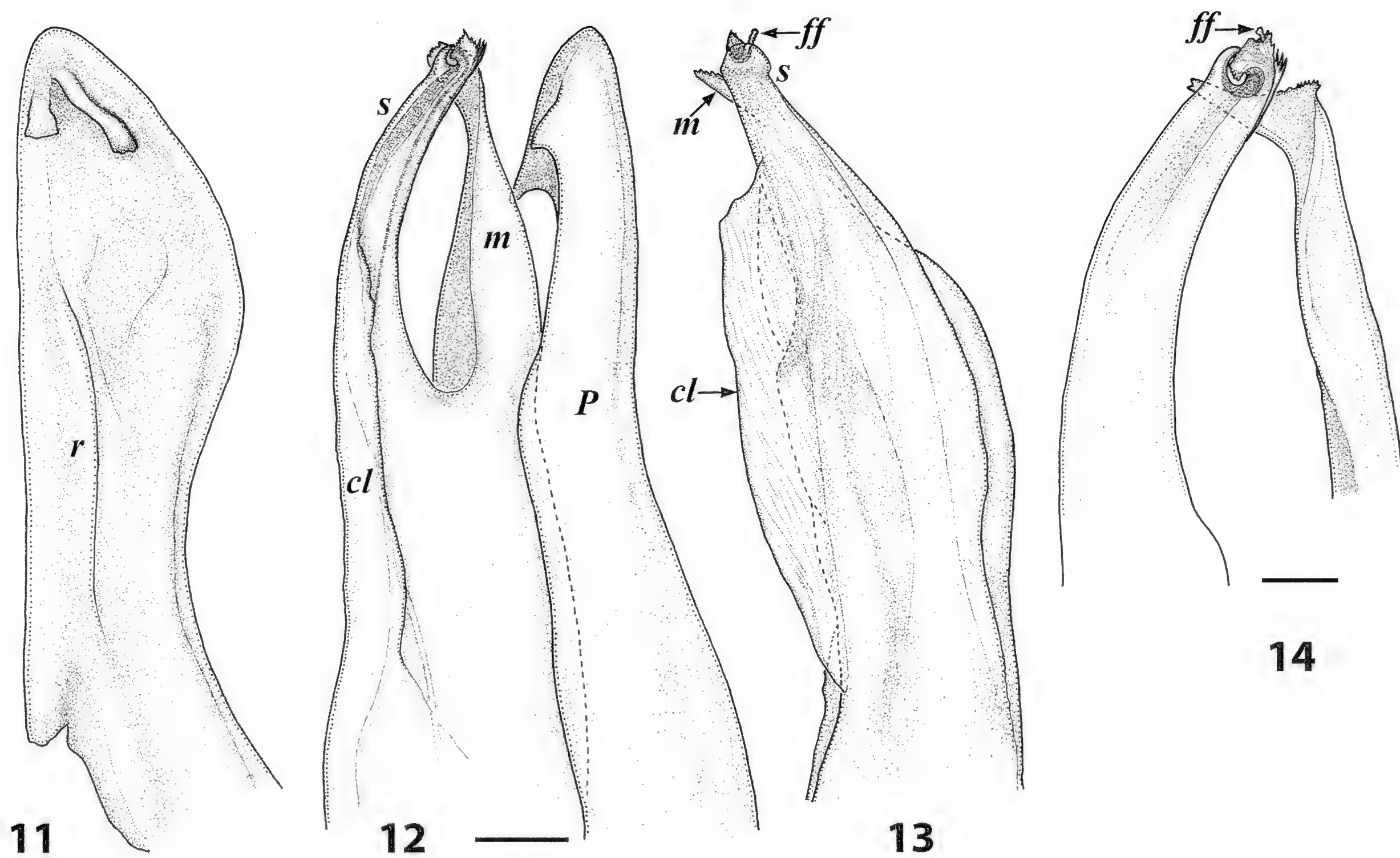
Figs 5-10. *Syrioiulus lohmanderi* sp. nov., structures of male holotype (5-9) and female paratype (10), in MHNG. (5) Antenna. (6) Leg-pair 1, frontal view. (7) Leg 2. (8) Leg 3. (9) Right ventral edge of pleurotergum 7, ventro-lateral view. (10) Right vulva, caudal, slightly mesal view. Abbreviations: *ct* = central tube; *lv* = lateral valve; *ma* = mesal ampulla; *mt* = mesal tube; *mv* = mesal valve; *op* = operculum. Scale bar of Fig. 8: 0.2 mm; the rest: 0.1 mm.

with a pair of disto-median setae and a transverse row of around 10 setae proximally to the former. Paraprocts densely covered with long setae, without rows of short and stiff setae along caudal margins.

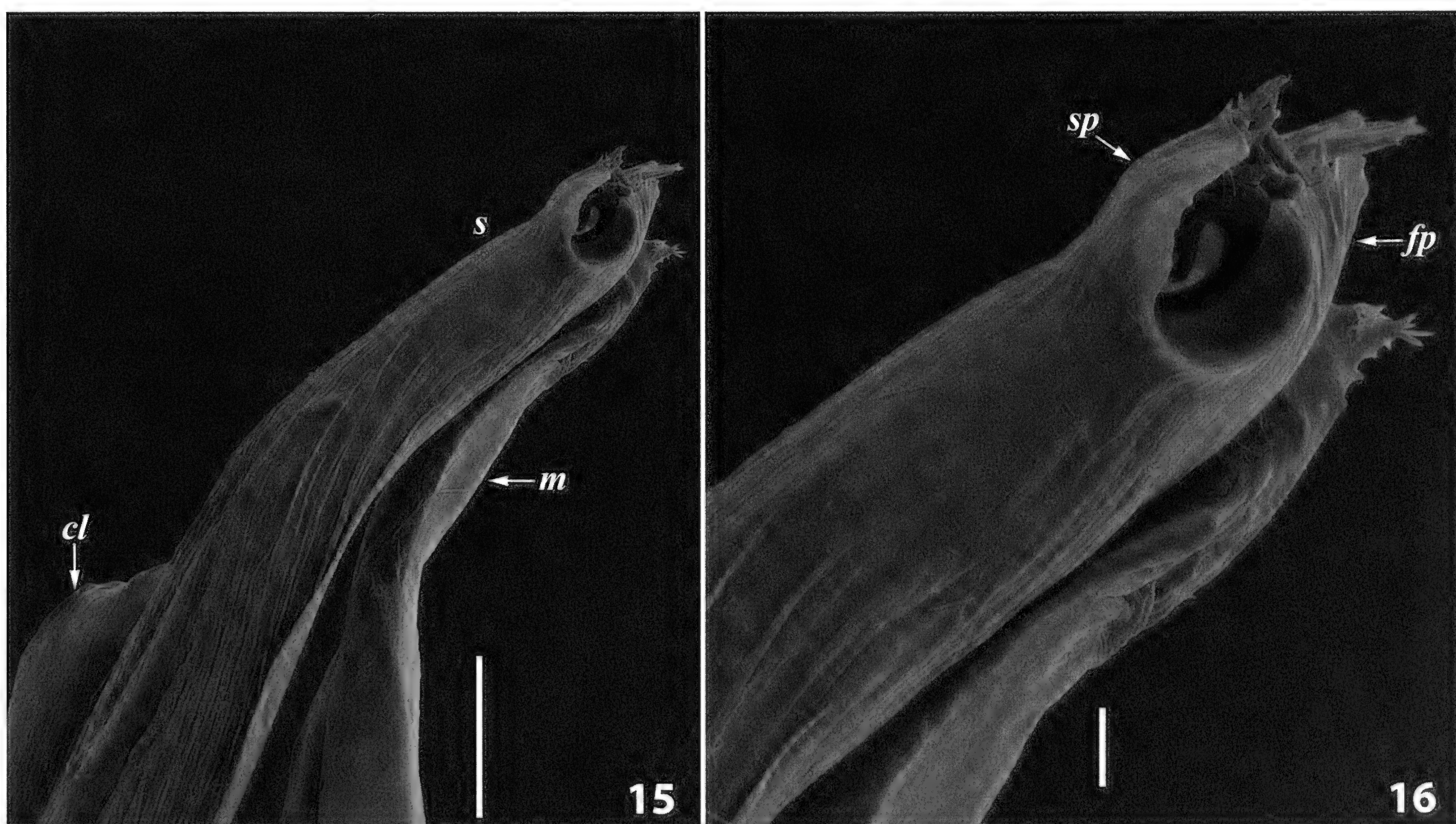
Male sexual characters: Mandibular stipites (see Fig. 1) forming rather small, rounded, frontoventral lobes. Leg-pair 1 (Fig. 6) developed as compact hooks pointing mostly mesad, with a tapering tibial outgrowth and a minute, knob-like, tarsal remnant. Leg-pair 2 (Fig. 7) with two crested adhesive pads, one each on postfemur and tibia. Leg-pair 3 (Fig. 8) and following pairs additionally with a

vestigial pad on femur; all pads gradually diminishing in size towards telson, completely disappearing in posterior third of body. Pleurotergum 7 (Fig. 9) ventrally forming large, rounded lobes originating from the border between pro- and metazona, protruding mostly ventrad. Penis soft, hyaline, with deeply divided, conoidal lobes ending up in fingertip-like terminal lamellae turned slightly caudad.

Gonopods (Figs 11-16): Promere (Fig. 11, *P* in Fig. 12) relatively slender and spoon-like, tapering, as high as opisthomere; width of shaft about 0.7 times that of bowl; ridge (*r*) massive and rounded, without freely



Figs 11-14. *Syrroiulus lohmanderi* sp. nov., gonopods of male holotype, in MHNG. (11) Left promere, caudal view. (12) Right pair of gonopods, mesal view. (13) Left opisthomere, caudal, slightly lateral view. (14) Distal parts of left opisthomere, lateral view. Abbreviations: *cl* = caudomesal lamella, *ff* = central filiform process, *fp* = fan-like process; *m* = mesomeral process; *P* = promere; *s* = solenomere; *sp* = shield-like process. Scale bar of Figs 11-13: 0.1 mm; Figs 14-15: 0.05 mm; Fig. 16: 0.01 mm.



Figs 15-16. *Syrroiulus lohmanderi* sp. nov., gonopods of male holotype, in MHNG. (15) Distal parts of left opisthomere, caudo-lateral view. (16) Solenomere, same aspect.

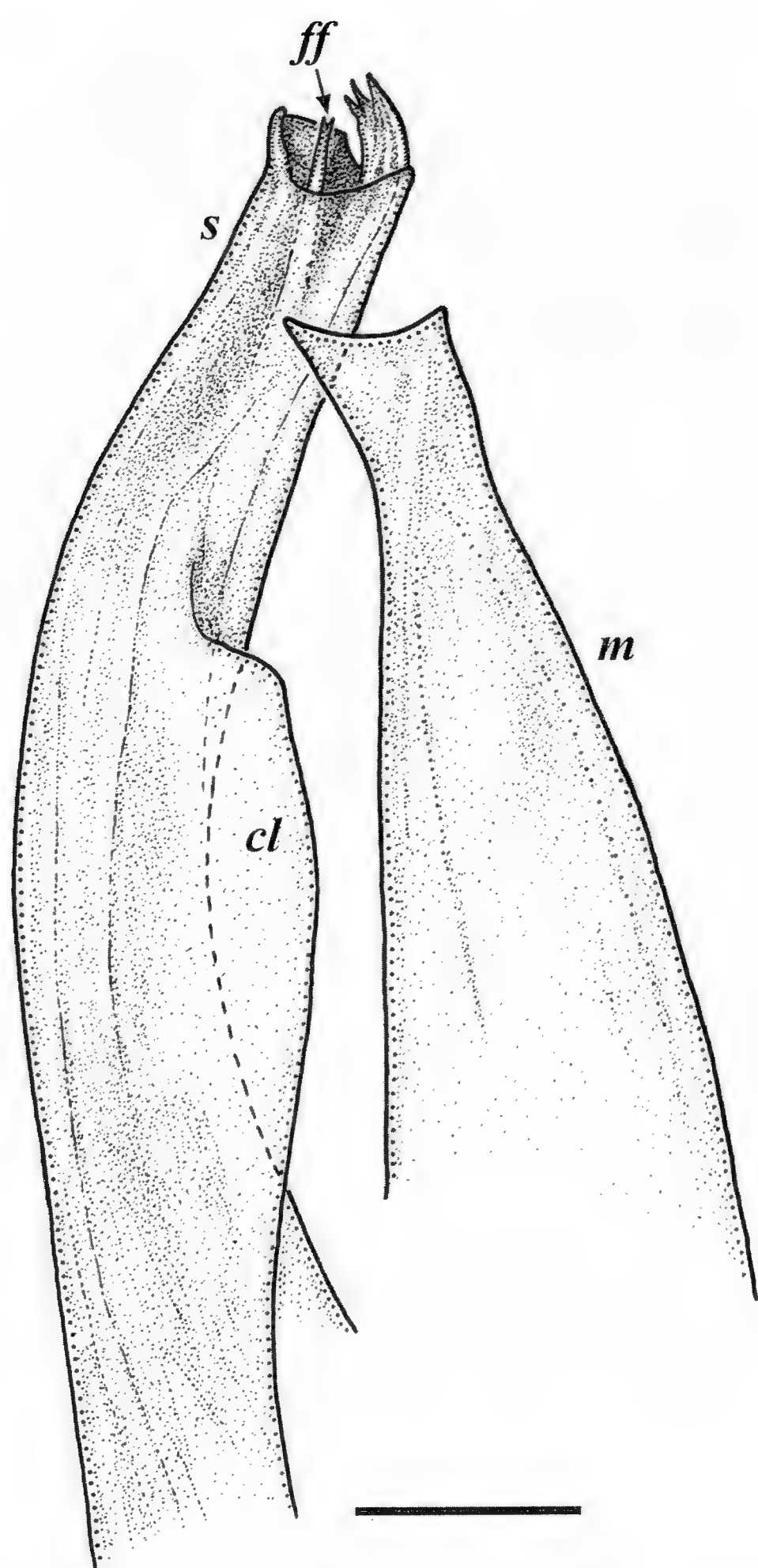


Fig. 17. *Syrioiulus astrabadensis* (Lohmander, 1932a), paratype male, in GNM, distal parts of right opisthomere in mesal view. Abbreviations: *cl* = caudomesal lamella; *ff* = central filiform process; *m* = mesomeral process; *s* = solenomere. Scale bar: 0.05 mm.

protruding apical part; apical denticles well developed, clearly separated, mesal one running vertical, lateral one somewhat oblique, both with blunt tips pointing caudo-basad. Opisthomere (Figs 12-16) approximately halfway divided into mesomeral process (*m*) and solenomere (*s*), these being subequal in height, forming a broad sinus between them; mesomeral process running mostly straight, at considerable distance from solenomere, apically broadened and spade-like, with a strongly elongated mesal corner turned caudad, partly concealing solenomere, and with a nearly right-angled lateral corner bearing several minute spines/denticles; caudomesal lamella (*cl*) well-developed, forming a narrow ridge protruding completely mesad, thus being clearly visible in frontal and caudal views; solenomere slender, gradually bent anteriad, ending in two small processes [an anterior, fan-like (*fp*) and a posterior, shield-like one

(*sp*)] surrounding a deep central concavity; a minute central filiform process (*ff*) visible in certain aspects; anterior lamella vestigial, recognizable only by several apical fringes.

Female sexual characters: Leg-pair 1 considerably, leg-pair 2 slightly flattened antero-caudally. Vulva (Fig. 10) strongly compressed in the sagittal plane; bursa mostly symmetric: lateral valve (*lv*) slightly higher and more narrow than mesal one (*mv*); median cleft relatively broad; operculum (*op*) by far exceeding bursa, apical margin with a distinct mid-lateral incision and with several bumps along mesal section; setation moderately dense, randomly spread across whole surface of vulva. Receptaculum seminis consisting of a narrow, nearly straight central tube (*ct*) supporting a very short mesal tube (*mt*) ending in a small, ovoid, mesal ampulla (*ma*).

Remarks: The type locality of the new species lies in the foothills of the Alborz Mountains, the mountain range where most *Syrioiulus* species from Iran were exclusively recorded (Fig. 18). The only exception is *S. zarudnyi* (Lohmander, 1932a) which is known also from two localities in the central part of the country. Considering the absence of ommatidia and the method (sifting dead organic matter) by which the studied specimens were collected, *S. lohmanderi* sp. nov. is likely an euedaphic species.

Syrioiulus astrabadensis (Lohmander, 1932)

Fig. 17

Amblyiulus astrabadensis Lohmander, 1932a: 30-33, figs 30-32.

Material: GNM; 2 (supposed) female syntypes of "*Amblyiulus astrabadensis* n. sp."; Persien: Astrabad (nr. 28); 02.May.1905, E. Filippowitsch. – GNM; 2 slide preparations of (supposed) female syntypes: *Amblyiul.* nr. 28, I: vulvae, legs, and mouthparts, and *Amblyiul.* nr. 28, II: mouthparts and vulvae. – GNM; 2 slide preparations of (supposed) male syntypes: *Amblyiul.* nr. 28: gonopods, mouthparts, legs, antennae, edges of pleurotergum 7, and *Amblyiul.* nr. 28, II: labrum, mandible, legs.

Type locality: Iran, Golestan province, Gorgan (formerly Esterabad).

Taxonomic notes: Promere virtually indistinguishable from that of *S. lohmanderi* sp. nov. Caudomesal lamella (*cl*) directed meso-anteriad rather than completely mesad. Mesomeral process (*m*) considerably shorter than solenomere (*s*), without strongly protruding apical corners; solenomere apically forming more shallow concavity in comparison with *S. lohmanderi* sp. nov., and with an anterior process directed mostly distad rather than bent caudad. A very fine central filiform process (*ff*), similar to that of *S. lohmanderi* sp. nov., visible.

Remarks: Despite the conspicuous similarities between the gonopods of *S. astrabadensis* and *S. lohmanderi* sp. nov., the two species can be rather easily distinguished by overall appearance: *S. astrabadensis* is less than 25 mm in length and entirely pallid, whereas *S. lohmanderi* sp. nov. is 28-29 mm long and has a brownish pigmentation. Likewise, the very similar gonopod conformation in *S. persicus* is in a way counterbalanced by the setose metazonal hind margins in this species; both *S. astrabadensis* and *S. lohmanderi* sp. nov. lack metazonal setae. Examples of species with (almost) completely identical gonopods but otherwise obvious differences in size and colouration are not uncommon in Pachyiulini (e.g. Frederiksen *et al.*, 2012; Golovatch, 2018).

Provisional checklist of species of *Syrroiulus*

Syrroiulus adsharicus (Lohmander, 1936) comb. nov.

Amblyiulus (*Heteropachyiulus*) *adsharicus* Lohmander, 1936: 156-159, figs 131-132.

Amblyiulus adsharicus. – Kokhia & Golovatch, 2018: 40.

Known records: Ajara [geographic region], region of Batumi, “Bortschcha” [probably Borçka, Turkey, about 15 km south of the border with Georgia] (type locality).

Note: The original gonopod drawings clearly show an apically concave solenomere which lacks both a rod-like mesal process and an anterior lamella, or the latter is very weakly pronounced. Thus, the species is here transferred from *Amblyiulus* to *Syrroiulus*.

Syrroiulus aharonii (Verhoeff 1914)

Pachyiulus (*Trichopachyiulus*) *aharonii* Verhoeff, 1914: 64-65, no figures.

Micropachyiulus (*Syrroiulus*) *aharonii*. – Verhoeff, 1923: 120, 122-123, figs 1-2.

Amblyiulus Aharonii (sic!). – Attems, 1926: 258, 260.

Amblyiulus aharonii. – Bodenheimer, 1937: 233. – Tabacaru, 1995: 24.

Syrroiulus aharoni (sic!). – Mauriès, 1982: 441.

Syrroiulus aharonii. – Golovatch, 2018: 794, figs 3A-D, 4A-D.

Known records: All from Israel: Rehovot (type locality); by the Sea of Galilee (Verhoeff, 1923); Allone [Alonei] Abba, Beqaot S of Bet Shean [Beit She’an], Allonim, Nilit (Golovatch, 2018).

Syrroiulus andreevi Mauriès, 1984

Syrroiulus andreevi Mauriès, 1984: 44-48, figs 12-20. – Stoev & Beron, 2001: 100.

Known records: Greece, Paros Island, Marathi (type locality).

Syrroiulus astrabadensis (Lohmander, 1932)

Amblyiulus astrabadensis Lohmander, 1932a: 30-33, figs 30-32.

Syrroiulus astrabadensis. – Mauriès, 1984: 48. – Enghoff & Moravvej, 2005: 64.

Known records: Iran, Gorgan (type locality).

? *Syrroiulus cappadocius* (Lohmander, 1939) comb. nov.

Amblyiulus cappadocius Lohmander, 1939: 138-140, figs 19-22. – Mauriès, 1982: 441.

Amblyiulus cappdoicus (sic!). – Enghoff, 2006: 180.

Known records: Turkey, Keğubat near Kayseri (type locality).

Note: The solenomere in this species ends up with a broad and blunt tip, while it lacks a rod-like mesal process, and the anterior lamella does not form an apical protrusion. This combination of characters does not correspond to the latest concept of *Amblyiulus* (see Golovatch, 2018) but it fits the current diagnosis of *Syrroiulus*. Thus the species is here transferred to *Syrroiulus*. However, the pronouncedly spoon-shaped promere, with a lateral prominence and the mesomeral process tightly contiguous with the solenomere, partly concealing the latter in lateral view, are untypical of *Syrroiulus*, but are rather common within the genera *Amblyiulus* and *Dolichoiulus*. Hence the question mark applied.

Syrroiulus continentalis (Attems, 1903)

Pachyiulus (*Dolichoiulus*) *continentalis* Attems, 1903: 147-148, figs 82-84.

Amblyiulus continentalis. – Lohmander, 1932a: 40, 41, figs 33-35. – Bababekova, 1996: 90.

Syrroiulus continentalis. – Mauriès, 1982: 441. – Mauriès, 1984: 48.

Known records: Azerbaijan, Lenkoran [Lankaran] (type locality); Iran, the vicinity of Gorgan (Lohmander, 1932a).

Syrroiulus discolor (Lohmander, 1932)

Amblyiulus discolor Lohmander, 1932a: 28-30, figs 27-29.

Syrroiulus discolor. – Mauriès, 1982: 441. – Enghoff & Moravvej, 2005: 64.

Known records: Iran, Garmab Plain near Gorgan (type locality).

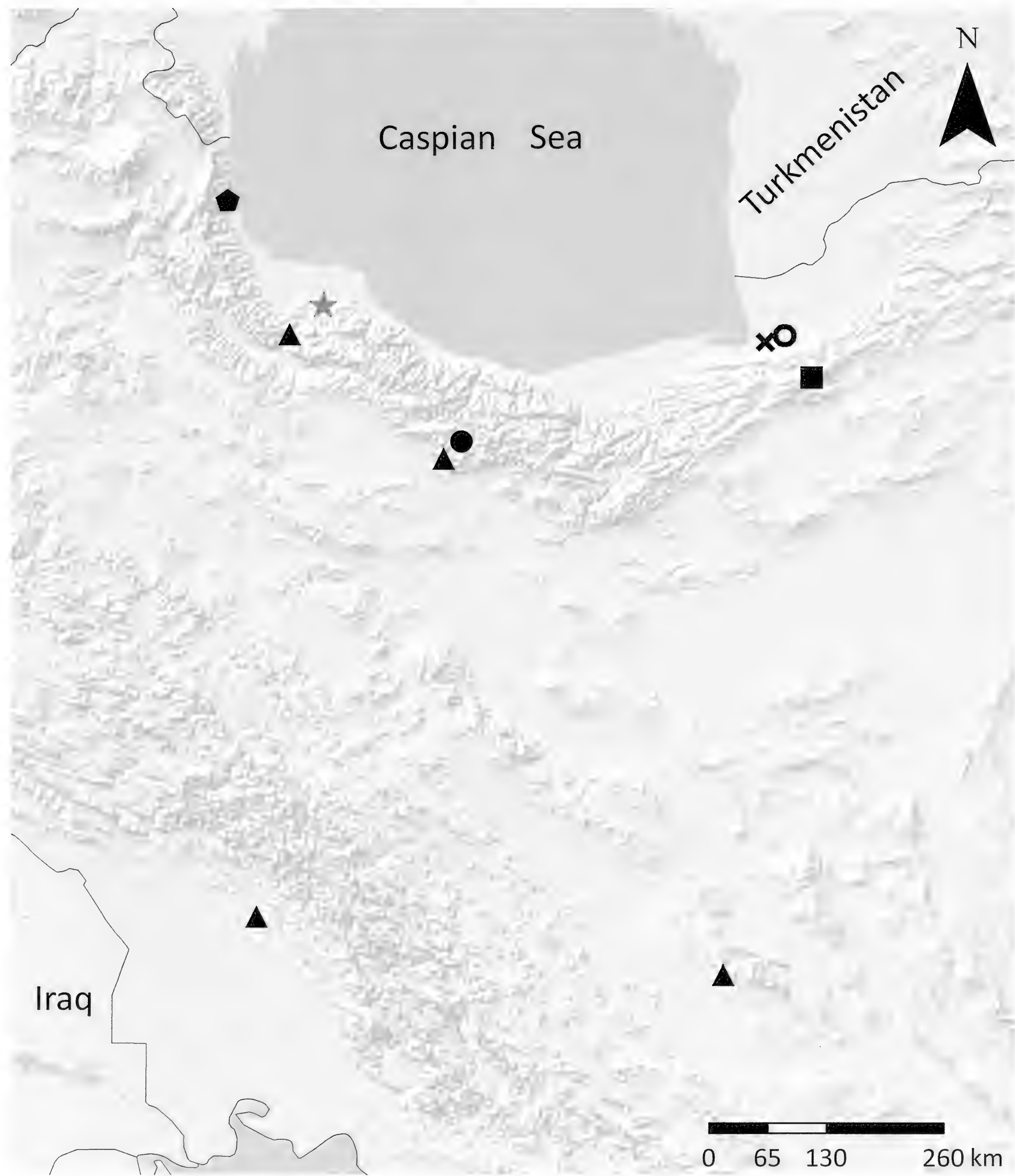
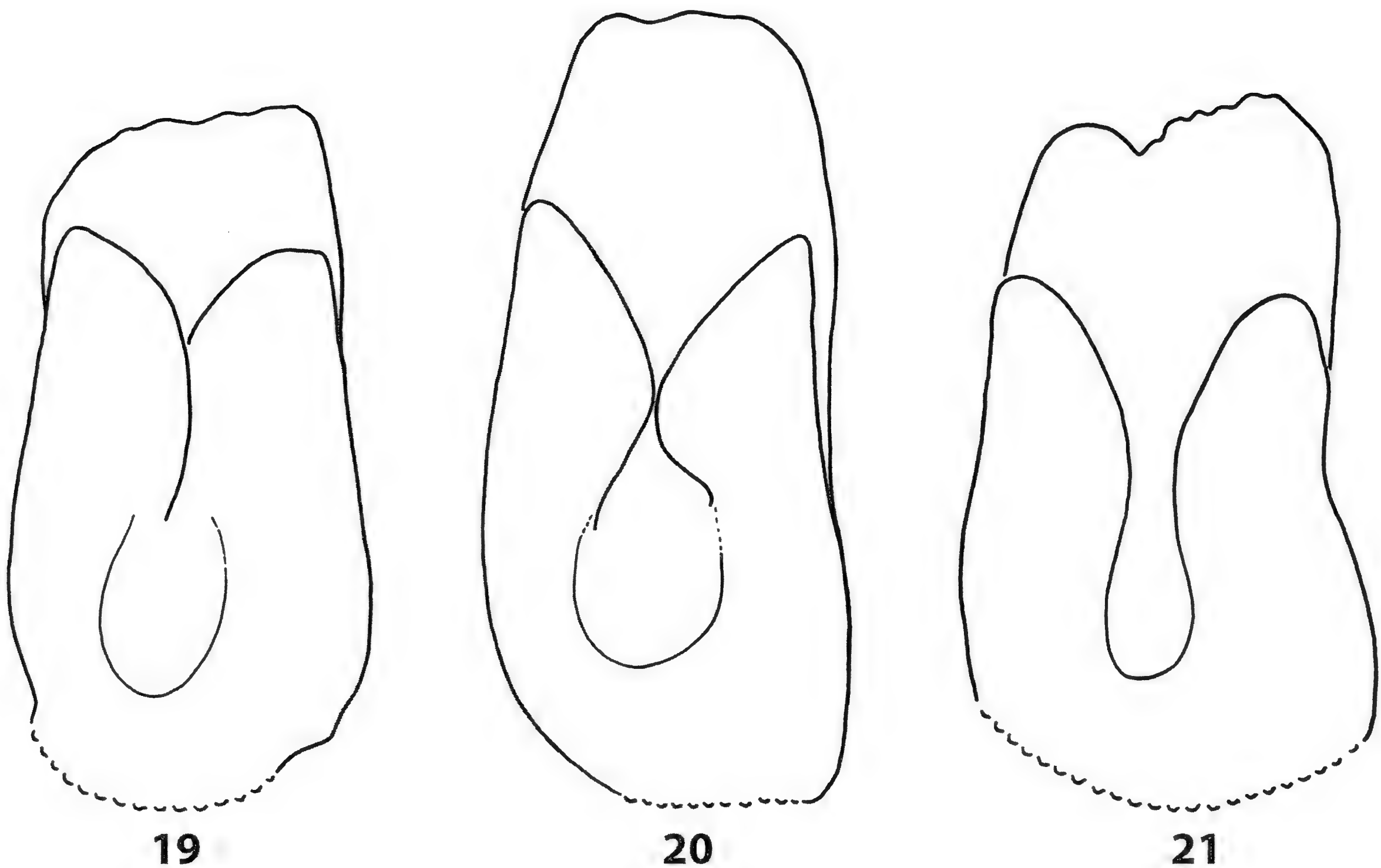


Fig. 18. Localities of *Syrioilulus* spp. in Iran. Ring: *S. astrabadensis*; cross: *S. continentalis*; square: *S. discolor*; pentagon: *S. incarnatus*; star: *S. lohmanderi* sp. nov.; filled circle: *S. persicus*; triangle: *S. zarudnyi*.



Figs 19-21. Semidiagrammatic drawings of vulvae in caudal views of *Syrroiulus* spp. (19) *S. astrabadensis*. (20) *S. incarnatus*. (21) *S. lohmanderi* sp. nov. (Figs 19-20 redrawn from Lohmander, 1932a). Not to scale.

Syrroiulus incarnatus (Lohmander, 1932)

Amblyiulus incarnatus Lohmander, 1932a: 33-35, fig. 26.

? *Syrroiulus incarnatus*. – Mauriès, 1982: 441.

Syrroiulus incarnatus. – Mauriès, 1984: 48. – Enghoff & Moravvej, 2005: 64.

Known records: Iran, eastern slopes of Bogrov Dāgh [Talysh Mts], “Altschaly” (type locality).

Note: Despite the unknown male characters, the vulval structure in this species is so similar with that observed in the other three blind representatives of *Syrroiulus* known from Iran that there can be no doubt that *incarnatus* is their congener.

Syrroiulus lohmanderi sp. nov.

Known records: Iran, Gilan Province, Siahkal (type locality).

Syrroiulus persicus (Golovatch, 1983)

Amblyiulus persicus Golovatch, 1983: 161-162, figs 3-7.

Syrroiulus persicus. – Enghoff & Moravvej, 2005: 65.

Known records: Iran, 10 km N of Keredj [Karaj] (type locality).

Syrroiulus polyzonus (Attems, 1911)

Dolichoiulus polyzonus Attems, 1911: 66-67.

Dolichoiulus (Syrroiulus) polyzonus. – Verhoeff, 1914: 64.

Micropachyiulus (Syrroiulus) polyzonus. – Verhoeff, 1923: 122-123.

Amblyiulus polyzonus. – Attems, 1926: 263-264, figs 15-18.

Syrroiulus polyzonus. – Jeekel, 1970: 171.

Known records: Syria, Berzé [Barzeh, today part of Damascus] (type locality).

? *Syrroiulus posthirsutus* (Verhoeff, 1923)

Pachyiulus (Trichopachyiulus) posthirsutus Verhoeff, 1923: 120, 123-125, figs 4-6.

Amblyiulus posthirsutus. – Attems, 1926: 258-259. – Bodenheimer, 1937: 233. – Tabacaru, 1995: 24.

Trichopachyiulus (Iudaeoiulus) posthirsutus. – Verhoeff, 1930: 1670.

Syrroiulus sp. – Golovatch & Wytwer, 2009: 170.

Syrroiulus posthirsutus. – Golovatch, 2018: 792-794, figs 1A-C, 2A-E.

Known records: All from Israel: Rehovot, Hulda, Nahal Rubin National Park, by the Sea of Galilee (original localities); Judean Mts, Devir (Golovatch & Wytwer, 2009; Golovatch, 2018); Timrat, Allonim, Nahal Mearot Nature Preserve, Givat Yeshaiahu, Regba (Golovatch, 2018).

Note: Although the solenomere in this species seems to correspond with the current diagnosis of *Syrroiulus*, the intermediate lobe connecting the proximal sections of mesomer process and solenomere, and especially the complete absence of apical denticles on the promere are characters that set *S. posthirsutus* apart from all remaining congeners, hence the question mark.

Syrroiulus taliscius (Attems, 1927)

Amblyiulus taliscius Attems, 1927: 243-244, figs 336-338. – Bababekova, 1996: 90. – Lohmander, 1932b: 182.
Syrroiulus taliscius. – Mauriès, 1982: 441.

Known records: Azerbaijan, Lenkoran [Lankaran], area of Talysh Mts (type locality).

? *Syrroiulus zarudnyi* (Lohmander, 1932)

Amblyiulus zarudnyi Lohmander, 1932a: 23-27, figs 21-25. – Golovatch, 1983: 161.
Syrroiulus zarudni (sic!). – Mauriès, 1982: 441.
Syrroiulus zarydnyi. – Mauriès, 1984: 48. – Enghoff & Moravvej, 2005: 65.

Known records: All from Iran, Khuzestan Province (type locality) [exact locality unknown]; NW Iran, Canyon Sefidruda [on Sefid-rud River]; 68 km SW of Yezd; N end of Keredj [Karaj] (Golovatch, 1983).

Note: This is another species of *Syrroiulus* deviating from the majority of congeners by the conformations of promere and mesomer processes which are alike those of *S. cappadocius*. Furthermore, *S. zarudnyi* has a prominent anterior lamella of the solenomere (albeit apically not drawn into a process) which is also untypical of the genus. However, before a comprehensive revision and phylogeny of *Syrroiulus* and related genera is made, it seems better that this and the other two aforementioned doubtful species are placed in *Syrroiulus*.

According to Lohmander (1932a) the type locality of *S. zarudnyi* is the “Tschemle-Rogan” Spring in Arabistan (today Khuzestan Province). The toponym obviously refers to “Tscheschme-Rogan” [“Cheshme” (English transliteration) meaning “spring” in Persian], “in the land of the Bakhtiary people”. This is one of the sites visited by the original collector of this species, the Russian zoologist Nikolai Zarudny, during his forth expedition to Iran (Birula, 1905). The exact location of that spring remains

Key to the species of *Syrroiulus* known from Iran based on characters of gonopods, vulvae and external somatic morphology

- 1A With ommatidia2
- 1B Without ommatidia4
- 2A Opisthomere with a poorly developed mesocaudal lamella and a thick, apically finely dentate, anterior lamella
.....*S. zarudnyi* (Lohmander, 1932)
- 2B Opisthomere with a well-developed mesocaudal lamella and a rather indistinct anterior lamella3
- 3A Mesocaudal lamella apically forming a freely protruding pointed outgrowth, this being subequal to or slightly exceeding solenomere; ozopores in anterior part of body set at some distance behind pro-metazonal suture; metazonal hind margins without setae; walking legs in males without adhesive pads
.....*S. discolor* (Lohmander, 1932)
- 3B Mesocaudal lamella without freely protruding apical part but ending bluntly much lower than tip of solenomere; ozopores in anterior part of body set right behind pro-metazonal suture; metazonal hind margins with a whorl of short setae; walking legs in males with adhesive pads on tibiae *S. continentalis* (Attems, 1903)
- 4A Metazonal hind margins with a whorl of setae; vulval operculum only slightly exceeding bursa; promere with a rounded, lobe-like mesal denticle*S. persicus* (Golovatch, 1983)
- 4B Metazonal hind margins without setae; vulval operculum considerably exceeding bursa 5
- 5A Ozopores in anterior part of body set at 1/4-1/3 of metazonal length behind pro-metazonal suture; apical margin of vulval operculum with a distinct incision mid-laterally (Figs 10, 21); mesomer process subequal to solenomere (Figs 12, 14, 15, 16)*S. lohmanderi* sp. nov.
- 5B Ozopores in anterior part of body set on or right behind pro-metazonal sutures; apical margin of vulval operculum more or less smooth 6
- 6A Vulva with its operculum exceeding bursa by 1/4-1/3 of total vulval height (Fig. 20); adult females 30-32 mm in length and 2.1-2.3 mm in diameter*S. incarnatus* (Lohmander, 1932) (known only from females)
- 6B Vulva with its operculum exceeding bursa by 1/5-1/4 of total vulval height (Fig. 19); females 24-28 mm in length and 1.4-1.5 mm in diameter; males with expanded mandibular stipites; mesomer process shorter than solenomere (Fig. 17)*S. astrabadensis* (Lohmander, 1932)

unknown, but it is most likely situated in the eastern parts of Khuzestan which is inhabited predominantly by the Bakhtiari ethnic group.

CONCLUDING REMARKS

Despite the present contribution, the scope of the name *Syrroiulus* remains rather vague. The diagnosis of the genus is unsatisfactory, as none of the two main characters that delimit it from the similar *Afropachyiulus*, *Amblyiulus*, *Dolichoiulus*, and *Japanoiulus* can be considered apomorphic. The absence of a distinct apical process formed by the anterior lamella of the solenomere is apparently the plesiomorphic state within Pachyiulini, as it is observed in the majority of representatives of the same tribe except for the four aforementioned genera. As regards the blunt or concave solenomerical apex, in the absence of any recognizable, specialized structure this character is too obscure to reliably indicate a monophyly of *Syrroiulus* in its presently accepted species composition.

Afropachyiulus is even more problematic in that respect, with two of its species, *A. comatus* (Attems, 1899) and *A. mauriesi* Akkari & Enghoff, 2008, having a gonopod conformation typical of *Dolichoiulus*, while the filiform process on the mesal side of the solenomere seen in *A. lepineyi* (Verhoeff, 1936) and *A. maritimus* Strasser, 1970 may be homologous with the rod-like process in the type species of *Amblyiulus*, viz. *A. barroisi* Porrat, 1893. *Amblyiulus* itself appears as a heterogenous assemblage: apart from *A. barroisi*, the diagnostic, rod-like process is known only in *A. cedrophilus*, while other congeners show more or less “*Dolichoiulus*-like” gonopods (Enghoff, 1992, personal observations). The last holds true also for *Japanoiulus lobatus* Verhoeff, 1937, the sole species of the monotypic genus *Japanoiulus*. The only difference between it and species of *Dolichoiulus* seems to be the presence of one instead of two apical denticles on the promere (Enghoff, 1992). However, one apical denticle is also characteristic of some species of *Afropachyiulus* (see Enghoff, 1992; Akkari & Enghoff, 2008).

Given the remarkable simplicity and monotony of the gonopods, and the mostly random distribution of most of the potentially diagnostic external somatic characters, e.g. setation (Golovatch, 2008), a solid revision and phylogeny of *Syrroiulus* and the above-discussed related genera will inevitably have to include molecular data.

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Jumping spiders of the genus *Phintelloides* from India, with the description of a new species (Araneae: Salticidae: Chrysillini)

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Abstract: *Phintelloides manipur* Caleb sp. nov. is diagnosed and described from north-eastern India. *Phintelloides versicolor* (C.L. Koch, 1846) is recorded for the first time from India and Myanmar. Two new combinations are proposed: *Phintelloides singhi* (Monga, Singh & Sadana, 1989) comb. nov. transferred from *Marpissa* C.L. Koch, 1846 and *Phintelloides undulata* (Caleb & Karthikeyani, 2015) comb. nov. transferred from *Cosmophasis* Simon, 1901. The distribution of the genus in India and Myanmar is mapped.

Keywords: Manipur - Myanmar - new combinations - new record - taxonomy.

INTRODUCTION

The chrysilline genus *Phintelloides* was recently established by Kanesharatnam & Benjamin in 2019, with *Chrysilla jesudasi* (Caleb & Mathai, 2014) as its type species. Currently, the genus is represented by seven valid species. The type species is the sole representative occurring in India, six species are known from Sri Lanka, and one species, *Phintelloides versicolor* (C.L. Koch, 1846) is widespread in East and Southeast Asia (Caleb, 2019; World Spider Catalog, 2020). This paper presents the description of a new species from northeastern India, along with the proposal of two new combinations for misplaced species and new distributional records for *P. versicolor*.

MATERIAL AND METHODS

Morphological examination and photography was performed under a Leica M205A stereomicroscope mounted with a Leica DFC500 HD camera enabled with Leica Application Suite (LAS) version 3.8. Leg measurements are given in the following manner: total (femur, patella, tibia, metatarsus, tarsus). Spine positions are as follows: prolateral, dorsal, retrolateral and ventral. Terminology follows Kanesharatnam & Benjamin (2019). All measurements are in millimetres. The studied specimens are kept in the National Zoological Collections, Zoological Survey of India, Kolkata (NZC-ZSI).

Abbreviations used in the text are as follows: AER = anterior eye row length; ALE = anterior lateral eye diameter; ALT = apical lobe of tegulum; AME = anterior median eye diameter; EFL = eye field length; PER = posterior eye row length; PLE = posterior lateral eye diameter; PME = posterior median eye diameter; RTA = retrolateral tibial apophysis; TB = tegular bump. Additional abbreviations are given in the legends of Figs 7-8.

TAXONOMY

Genus *Phintelloides* Kanesharatnam & Benjamin, 2019

***Phintelloides manipur* Caleb sp. nov.**

Figs 1-8

Type material: NZC-ZSI 6944/18; male holotype; India, Manipur, exact locality and collector unknown (specimen found along with other spider specimens in the Manipur State survey collections without any specific label).

Etymology: The species is named after the Indian state of Manipur where the holotype was collected. The epithet is a noun in apposition.

Diagnosis: This species is similar to other congeners in its general morphology and color pattern but can be clearly distinguished by the morphology of its male copulatory organs: the palp with a shorter embolus

(comparably shorter than in other congeners but longer than in *P. versicolor*) and an elongated ALT, reaching past the distal margin of the tegulum (Figs 5-8). The palp is similar to that of *P. brunne* Kanesharatnam & Benjamin, 2019 but can be differentiated by the presence of a TB and by the RTA tip being gently curved (TB absent and hook-shaped RTA in *P. brunne*).

Description: *Male holotype*. Total length 4.48; carapace 1.92 long, 1.56 wide; abdomen 2.56 long, 1.10 wide. Carapace brown, clothed with a small patch of whitish setae between and behind AMEs. Lateral margins of carapace each covered with a broad band of white hairs. Posterior eyes surrounded by black patches (Fig. 1). AMEs lined by dense short fringe of orange setae anteriorly; clypeus brownish, with a small patch of white scales in the middle (Fig. 2). Eye measurements: AME 0.45, ALE 0.22, PME 0.05, PLE 0.21, AER 1.31, PER 1.23, EFL 0.94. Clypeus height 0.18. Sternum yellowish. Chelicerae reddish brown, with two teeth on promargin and one tooth on retromargin; labium and maxillae yellowish brown (Fig. 3). Leg I more robust than other legs and dark brown. Legs II to IV brownish yellow (Fig. 1). Leg measurements: I 4.72 (1.37, 0.76, 1.07, 1.01, 0.51); II 3.60 (1.08, 0.57, 0.72, 0.83, 0.40); III 4.34 (1.32, 0.58, 0.87, 1.07, 0.50); IV 4.70 (1.45, 0.57, 0.99, 1.14, 0.55). Leg formula: 1432. Spination of legs: femora I 0700, II 0900, III 0900, IV 0700; patellae I-IV 0010; tibiae I 2036, II 2036, III 3034, IV 3034; metatarsi I 1014, II 2024, III 2024, IV 2024; tarsi I-IV 0000. Abdomen long and narrow, yellowish, with a brownish median band fading posteriorly; venter yellowish, with mid-longitudinal discontinuous brown band. Spinnerets brownish yellow (Fig. 1). Palps yellowish brown, covered with pale hairs. Embolus slender, medium-sized, wavy, bent at the tip and pointing retrolaterad; apical portion of bulbus extending beyond distal margin of tegulum. Bulbus longer than wide. Broad sperm duct visible in distal portion of tegulum. Tegulum with small posterior lobe and tegular bump. RTA broad at base, tapering toward tip, gently curving ventrad (Figs 4-8).

Female. Unknown.

Distribution: India (Manipur) (Fig. 9).

***Phintelloides singhi* (Monga, Singh & Sadana, 1989)
comb. nov.**

Marpissa singhi Monga, Singh & Sadana, 1989: 592, figs 1-2.

Remarks: This species was described from the female holotype from the Kalesar Reserve forest in the Haryana State. Though the authors mentioned that the type specimen will be deposited in NZC-ZSI, it has not yet arrived there and therefore is not yet available for re-examination. Since the original description and illustrations are poor, details of genital morphology

remain unknown. The identity of this species thus remains unclear until further conspecific specimens are collected at the type locality. This species does not belong in *Marpissa* since no true *Marpissa* is yet reported in India. Therefore, a provisional placement in *Phintella* C.L. Koch, 1846, based on the general body form and genital morphology, was recently proposed by Prószyński & Caleb (2015). The species, however, more closely resembles members of the genus *Phintelloides*. The abdomen is devoid of any stripe or pattern like in *P. flavoviri* Kanesharatnam & Benjamin, 2019 and *P. orbisa* Kanesharatnam & Benjamin, 2019, and the epigyne moreover strongly resembles that of *P. orbisa* (Monga, Singh & Sadana, 1989: figs 1, 2 cf. Kanesharatnam & Benjamin, 2019: figs 12A, E, G, 13A). It is therefore reasonable to transfer the species to *Phintelloides*.

***Phintelloides undulata* (Caleb & Karthikeyani, 2015)
comb. nov.**

Cosmophasis undulata Caleb & Karthikeyani, 2015: 97, figs 1-10.

Remarks: This species was described from Maharashtra State, from the male holotype only. It was originally placed in *Cosmophasis* due to resemblance in palp morphology. However, the general body color pattern is clearly different, resembling that of a few members previously placed in *Phintella*. We propose to place this species in the recently erected genus *Phintelloides* since it shares a synapomorphic character, i.e. the presence of a short white moustache on the clypeus, along with other characters such as a pale white band behind the anterior eye row, abdomen with a yellowish brown median band and two lateral whitish bands, and the palp with a comparably longer, more slender embolus, the tegulum with a small posterior lobe and a tegular bump, the RTA broader at its base and narrowing apically, with a hook-shaped tip (see Caleb & Karthikeyani, 2015: figs 1, 3, 6, 9). Thus we are convinced that its transfer to *Phintelloides* is fully justified.

***Phintelloides versicolor* (C.L. Koch, 1846)**

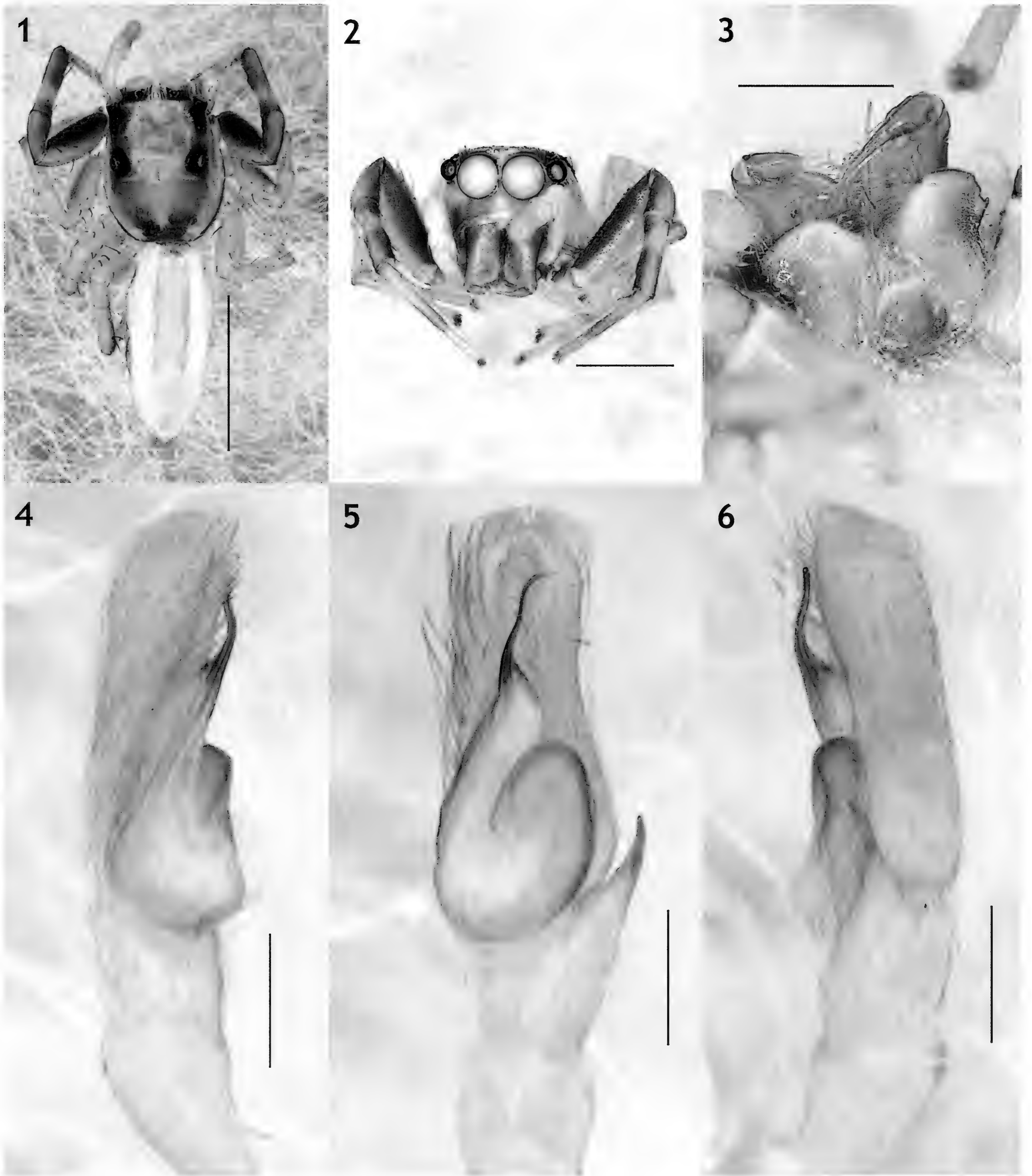
Plexippus versicolor C.L. Koch, 1846: 103, fig. 1165.

Chrysilla versicolor Prószyński, 1973: 98, figs 1-7; Żabka, 1985: 211, figs 83-96.

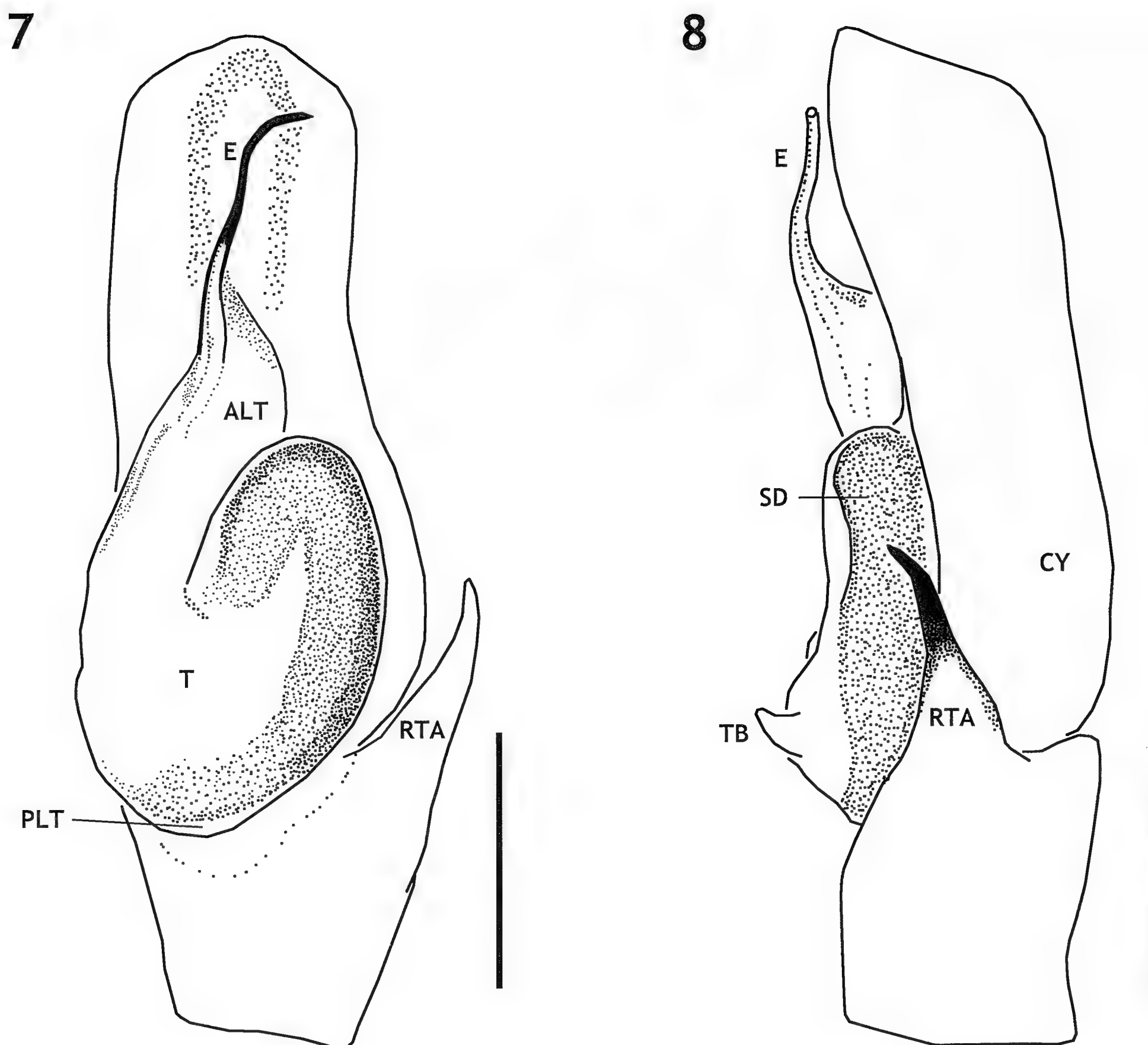
Phintelloides versicolor Kanesharatnam & Benjamin, 2019: 22.

For a complete list of taxonomic references see the World Spider Catalog (2020).

Specimens examined: NZC-ZSI 6945/18; 2 males, 2 females; west bank of Lacro River, 1525 m a.s.l., Moreh, Manipur, India; 13.IV.1992; leg. A.K. Hazra



Figs 1-6. *Phintelloides manipur* Caleb sp. nov., male holotype. (1) Habitus, dorsal view. (2) Frontal view. (3) Chelicerae, maxillae and labium, ventral view. (4) Left male palp, prolateral view. (5) Same, ventral view. (6) Same, retrolateral view. Scale lines: 2 mm (1); 1 mm (2); 0.5 mm (3); 0.2 mm (4-6).



Figs 7-8. *Phintelloides manipur* Caleb sp. nov., male holotype. (7) Left male palp, ventral view. (8) Same, retrolateral view. Abbreviations: ALT = apical lobe of tegulum; CY = cymbium; E = embolus; SD = sperm duct; PLT = proximal lobe of tegulum; RTA = retrolateral tibial apophysis; T = tegulum. Scale lines: 0.2 mm (7-8).

& party. – NZC-ZSI 7035/18; 1 female; Rain Forest Research Institute campus, 26.7824N, 94.2941E, 97 m a.s.l., Jorhat, Assam, India; 08.III.2019; leg. A. Rameshkumar. – NZC-ZSI 1542/17; 3 males, 2 females; Tharrawaddy, Myanmar (= Burma); leg. Oates; det. Thorell.

Distribution: India (new record), Myanmar (new record), China, Korea, Taiwan, Japan, Malaysia, Indonesia (Sumatra). Introduced to USA (Hawaii) (World Spider Catalog, 2020).

DISCUSSION

The Indian salticid fauna is currently represented by 257 species in 90 genera, and the tribe Chrysillini by 41 species in 12 genera (Maddison, 2015; Prószyński, 2016; Caleb, 2019). The following genera are included in the tribe Chrysillini, with the representative species numbers given in brackets: *Chrysilla* Thorell, 1887 (2); *Epocilla* Thorell, 1887 (4); *Heliophanus* C. L. Koch, 1833 (1); *Icius* Simon, 1876 (3); *Menemerus* Simon, 1868 (6);

Nandicius Prószyński, 2016 (4); *Nepalicius* Prószyński, 2016 (1); *Okinwaicius* Prószyński, 2016 (2); *Phintella* Strand, in Bösenberg & Strand, 1906 (11); *Phintelloides* Kanesharatnam & Benjamin, 2019 (5); *Rudakius* Prószyński, 2016 (1); *Siler* Simon, 1889 (1).

With the present study the diversity of *Phintelloides* species in India increases from a single species to five. Two of these, *P. jesudasi* and *P. versicolor*, are known from both sexes and the remaining three are known from one sex only. The new species (*P. manipur* sp. nov.) is described based on the male sex, while another species (*P. singhi* comb. nov.) is known only from the female. At the moment of writing this text, the holotype of *P. singhi* comb. nov. had not yet been received by NZC-ZSI and therefore could not be re-examined, denying us the opportunity to better characterize the species and to rule out the possibility that the male of the new species is conspecific with the female of *P. singhi* comb. nov. However, we consider it highly unlikely that the type of the new species is conspecific with the type of *P. singhi* comb. nov. since the localities of both species lie 1700 km apart, in different biogeographic zones. *Phintelloides*

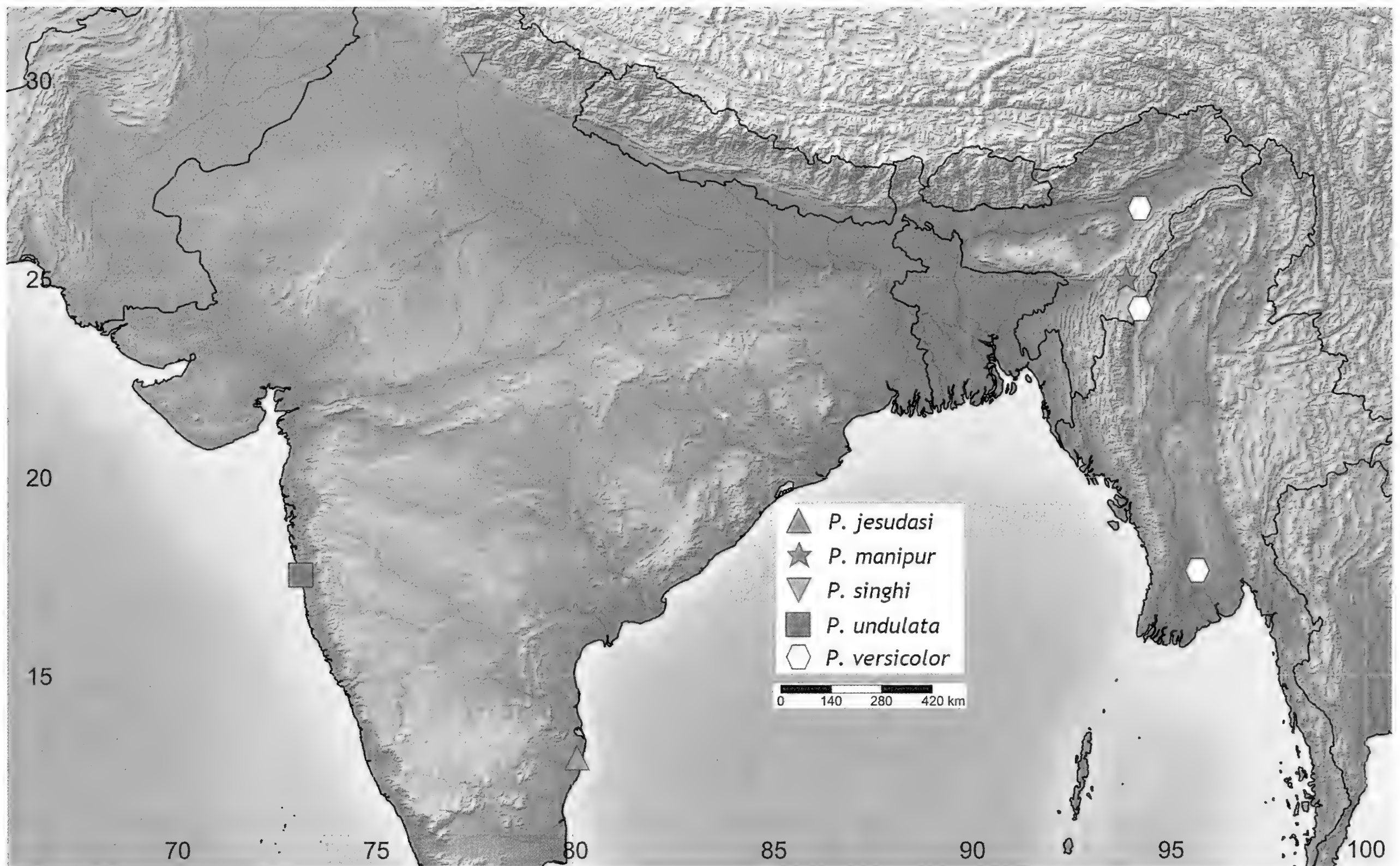


Fig. 9. Localities of *Phintelloides* species in India and Myanmar.

singhi comb. nov. occurs in the Shivalik foothills in the northwest Himalayan region and *P. manipur* sp. nov. in the northeastern hills of the Indo-Burma biodiversity hotspot (Fig. 9). Moreover, the actual diversity of *Phintelloides* in India may be underestimated due to inadequate sampling across the Indian subcontinent. Besides, the quite short embolus of the *P. manipur* sp. nov. holotype presumably corresponds with a relatively short insemination ducts in the conspecific female, as it can be seen in *P. brunne* (see Kanesharatnam & Benjamin, 2019: figs 10 G-H, 11A-D). The epigyne of *P. singhi* comb. nov. is similar to that of *P. orbisa*, which has longer ducts than *P. brunne*, and thus it can be expected that the *P. singhi* comb. nov. male has a longer embolus than that of *P. manipur* sp. nov. Therefore we have good reasons to believe that the male holotype of *P. manipur* sp. nov. and the female holotype of *P. singhi* comb. nov. are not conspecific. This assumption must, however, be confirmed by new specimens of both sexes from their respective type localities.

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First record of a presumed wild common genet (*Genetta genetta*) in Switzerland

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Abstract: The common genet (*Genetta genetta*) is the only Viverridae in Europe. For centuries, this secretive carnivore was largely confined to the Iberian Peninsula and to areas south of the Loire and west of the Rhône rivers in France. During the last decades, however, the common genet expanded its area of permanent presence beyond these historical geographic barriers. It has settled in new territories much further to the north and to the east, notably in Provence, and in the departments of Rhône and Ain. Genets have started to be sighted in north-western Italy as well. We report here two observations of this species recorded in June 2019 by a camera trap set along the Rhône River in a small forest of the municipality of Bernex, near Geneva. This is the first evidence of a presumed wild common genet living in Switzerland, suggesting an ongoing geographical expansion of the species already documented in the adjacent French departments of Haute-Savoie and Ain.

Keywords: *Genetta genetta* - Carnivora - camera trap - Switzerland.

Résumé: La genette commune (*Genetta genetta*) est le seul Viverridé sauvage d'Europe. Pendant des siècles, ce petit carnivore discret et nocturne était essentiellement confiné à la péninsule Ibérique et, en France, au sud de la Loire et à l'est du Rhône. Durant ces dernières décennies, cette espèce a cependant étendu son aire de répartition bien au-delà de ces barrières géographiques et des populations permanentes se sont maintenant installées plus au nord et à l'est, notamment en Provence et dans les départements du Rhône et de l'Ain. Elle est signalée plus à l'est jusque dans le Piedmont italien. Nous rapportons ici deux observations effectuées en juin 2019 par des pièges photographiques installés dans une petite forêt bordant le Rhône, dans la commune de Bernex, près de Genève. Ce sont les premières observations d'une genette commune d'origine présumée sauvage en Suisse. Ces observations font suite à un mouvement d'extension naturelle des populations de cette espèce déjà constaté dans les départements français voisins.

Mots-clés: *Genetta genetta* - Carnivora - piège photographique - Suisse.

INTRODUCTION

The common genet (*Genetta genetta*) is the only Viverridae (Carnivora, Mammalia) present in Europe. The diet of this small carnivore is relatively unspecialized and includes a variety of small vertebrates (rodents, shrews, birds, reptiles, etc.) as well as invertebrates and fruits, and thus will largely depend on seasonal and local food availability (Larivière & Calzada, 2001). In Europe and North Africa, the main energetic intake on which the species depends is generally the wood mouse (*Apodemus sylvaticus*) (Virgós *et al.*, 1999). Although it is usually associated with forested and rocky habitats, it is rather ubiquitous and is also tolerant to human proximity (Gaubert *et al.*,

2008). Habitat modelling in Europe suggests that this thermophilous species may be limited by the severity of winter temperatures (Camps *et al.*, 2016), although individuals have been sighted during snowy winters (e.g. Léger *et al.*, 1998).

The common genet – as the whole genus *Genetta* – is native to Africa, where it is widespread across most of the continent (Delibes & Gaubert, 2007; Jennings & Veron, 2009). The origin of the European populations of the common genet has been debated and was often attributed to the Romans or the Moorish who introduced them supposedly to control rodents around households (Bouillault & Filloux, 1955; Morales, 1994). Phylogeographic analyses based on multiple genetic

markers and a comprehensive geographic coverage indeed support that all European populations of genets are issued from few colonisation events from North Africa (Gaubert *et al.*, 2009, 2011). These studies also confirmed the hypothesis of two or three hotspots of introduction, one located in southern Iberia and the other in the Balearic Islands and/or Catalonia (Gaubert *et al.*, 2009, 2015). These molecular analyses, however, also suggested that the earliest colonisation in southern Iberia was older than expected as it occurred at least 3000 years ago. Genet introductions were thus possibly initiated by the Phoenicians during their trade across the Mediterranean, with secondary introductions into south-western Europe at subsequent historical periods (Gaubert *et al.*, 2009, 2015).

Historically, the common genet was largely confined to the Iberian Peninsula and south-western France, south of the Loire and west of the Rhône rivers (Schauenberg, 1966; Delibes, 1999; Larivière & Calzada, 2001), all extra-limital occurrences being attributed to deliberate introductions or to escaped pets (Schauenberg, 1966). However, the recent multiplication of validated records of genets eastward of these presumed geographic barriers suggest that established populations now exist in south-eastern France (Gaubert *et al.*, 2008), with sporadic individuals occurring even in north-western Italy. Specific census conducted in France by the national forest agency (ONCFS) during the period 1991-2009 further demonstrated the occasional presence of this elusive carnivore as far north as the Vosges and a more regular presence in Bourgogne and Franche-Comté as well as in Isère and Savoie (Léger & Ruelle, 2010), i.e. east of the Rhône River.

THE COMMON GENET IN SWITZERLAND

Historically, two common genets have already been recorded in Switzerland. One was an adult male trapped in a hen house in February 1919 near Laupersdorf, Solothurn, in the Jura Massif (Greppin, 1919), while the other was a male killed in December 1926 under the same circumstances in La Tour-de-Peilz, near Vevey, in the Swiss Prealps (Murisier, 1927). Both specimens were mounted and conserved in the collections of the Naturmuseum Solothurn and the Musée cantonal de zoologie of Lausanne, respectively. As these animals were discovered very far from the historical range of the species, Schauenberg (1966) discarded these records as being certainly issued from escaped animals.

In July 2012, one adult individual was photographed with a camera trap installed near Clarafond-Arcine in the Mt Vuache (Anonymous, 2012), a mountain of Haute-Savoie bordering the Geneva Basin and located about 7 km from the western border of Switzerland. A genet was observed again while walking on a stone wall in the same area, in November 2015 (LPO Haute-

Savoie, unpublished), suggesting that the species is established in this region.

During an ongoing study of badger populations (*Meles meles*) living in the southern region of the Geneva province, in Switzerland, one of us (JP) installed two camera traps (Browning Spec Ops Full HD 2018) along small trails on the left bank of the Rhône river in a small, forested gully (Bois de Châtillon, Bernex). This small riparian forest is composed of a dense mixture of broadleaf species (oaks, alder, willows and hazelnut trees) with sparse ground vegetation. The cameras were programmed to work throughout the day (24h) and to record a video of 20 s if triggered by a passing animal. After a trapping session of one month, we were surprised to find two videos triggered by a cat-like animal. According to its uniquely blotched coat and annulated tail (Fig. 1), and owing to its peculiar trotting tread (see the two videos deposited in Zenodo.org and can be retrieved via <https://doi.org/10.5281/zenodo.3617966>), we immediately identified the animal as a common genet. This camera trap was set against a tree trunk, about 30 cm above the ground and overlooking a sloping path (coordinates: 46.1921°N, 6.0609°E, at 389 m a.s.l.). The genet triggered the camera a first time on the 9th of June 2019 at 03:07 a.m., and six days later on the 15th June 2019 at 09:58 p.m. (Fig. 1); both events occurred at night-time. Other mammals recorded during the same trapping session by this camera included badgers, foxes (*Vulpes vulpes*), a roe deer (*Capreolus capreolus*), domestic cats (*Felis catus*), and dogs (*Canis familiaris*).

Immediately after this first session, we installed 12 new camera traps near the discovery point, along forested paths of the Rhône River and adjacent forests, between the 26th of June and the 15th of July, and another series of 10 traps between the 28th of August and 6th of November, but without success. Only other common mammals (roe deers, badgers, foxes, a beech marten, wild boars and domestic cats) were captured on film, but no genet was detected.

DISCUSSION

The common genet is a nocturnal and elusive mammal that is difficult to observe in its natural habitat and therefore the status of its local populations is difficult to evaluate accurately (Léger & Ruelle, 2010). But the continued geographic and demographic expansion recorded to the north-east of its historical range (Gaubert *et al.*, 2008; Léger & Ruelle, 2010), and in particular the two recent sightings (2012 and 2015) from the Mt Vuache, suggest that these animals may have settled in the Geneva basin. This climatically favourable area offers a variety of thermophilous forests interspaced with rocky outcrops (Gilliéron & Morel, 2018) that are likely suitable habitats for the



Fig. 1. Screen capture of the video recording a common genet (*Genetta genetta*) walking away from a camera trap set in the Châtillon forest, near Bernex, Geneva. This video was triggered by the genet on the 15th June 2019 at 09:58 p.m and is the second time that supposedly the same animal triggered the same camera six days earlier. The video recordings are available at <https://doi.org/10.5281/zenodo.3617966>.

genet. The animal caught twice by the camera trap set in the Châtillon forest is probably the same (unsexed) individual which stayed temporarily in this area. Given the proximity of a possible source area in the Mt Vuache (less than 10 km away) and because no common genet has been registered so far in zoos or private collections from Switzerland or nearby France, we assume that this animal is of wild origin and entered naturally into the territory of Switzerland. Hence, the common genet can be considered as the 99th species of wild mammal living in Switzerland (Gilliéron, in press), although it is probably not yet represented by permanent populations. Although Switzerland did not appear to be particularly favourable for the presence of genets in distribution models generated from historical occurrences (Camps *et al.*, 2016), the more thermophilous western portion of this country can now be considered a part of the colonization front of this species.

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New and little known Epilamprinae (Dictyoptera: Blaberidae) from the collections of the Muséum d'histoire naturelle de Genève and the Zoological Institute of Saint Petersburg.

Part 4

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Abstract: A new species of cockroach, *Placoblatta semialata* sp. nov., is described from Sulawesi. The names of the tribes Notolamprini Roth, 1971 syn. nov. and Colapteroblattini Roth & Gutiérrez, 1998 syn. nov. are synonymized with Poroblattini Roth, 1971. *Molytria inquinata* (Stål, 1860), *M. vegrande* Roth, 1999, and *Notolampra gibba* (Thunberg, 1826) are redescribed, and structures of the ovipositor of *M. inquinata* and *N. gibba* are described for the first time.

Keywords: Cockroaches - *Placoblatta semialata* - *Molytria inquinata* - *vegranda* - *Notolampra gibba* - Poroblattini - Colapteroblattini - Notolamprini - morphology - taxonomy.

INTRODUCTION

This is the forth paper devoted to cockroaches of the subfamily Epilamprinae (Blaberidae). In spite of the fact that many taxa were described many years ago, the morphology of this group is only insufficiently known. The aim of this and previous papers (Anisyutkin, 2015, 2016, 2018a) is to provide morphological descriptions which are detailed enough for further phylogenetic investigations.

MATERIAL AND METHODS

The author generally follows methods described in Anisyutkin (2014, 2015). Rehn's (1951) terminology of tegmina and wing venation is used. The description of anterior margin of fore femur armament follows Bey-Bienko (1950) and Roth (2003). The terminology of male genital sclerites follows Klass (1997) with some modifications. The terminology used by Grandcolas (1996) for genital structures is given in parentheses. The terminology of female genital structures follows McKittrick (1964) and Klass (1998).

The illustrations were sketched by means of a drawing tube on a Leica MZ 16 binocular microscope; further drawings and examinations were made with an MBS-10 binocular microscope.

The material studied has been deposited in the Muséum d'histoire naturelle in Geneva (MHNG) and in the

Zoological Institute of the Russian Academy of Sciences in Saint-Petersburg, Russia (ZIN).

Abbreviation used in figures (see text for further details):

<i>aa.</i>	anterior arch of second valvifer of female genitalia;
<i>a.Par.</i>	isolated anterior sclerite of paraprocts;
<i>a.s.</i>	“additional spines” i.e. spines bordering euplantulae at inner and outer side;
<i>ap.scl.</i>	“apical sclerite” of sclerite L2D of male genitalia;
<i>b.L2D</i>	basal part of sclerite L2D of male genitalia;
<i>b.L3</i>	basal subsclerite of sclerite L3 of male genitalia;
<i>bd.s.</i>	brood sac of female genitalia;
<i>bsv.</i>	basivalvula of female genitalia;
<i>c.p.R1T</i>	caudal part of sclerite R1T of male genitalia;
<i>d.o.</i>	“dorsal outgrows” of apical part of sclerite L2D of male genitalia;
<i>f.s.</i>	“folded structure” of sclerite L3 of male genitalia;
<i>gg.</i>	gonangulum of female genitalia;
<i>IX</i>	9th abdominal tergite;
<i>L4U</i>	sclerites of male genitalia;
<i>Par.</i>	paraproct;
<i>pl.</i>	sclerotized lobes of 2nd and 3rd pairs of valves of female genitalia;

<i>R2, R3, R4, R5</i>	sclerites of male genitalia;
<i>s.bd.s.</i>	sclerite of brood sac of female genitalia;
<i>s.t.</i>	“small tooth” of apical part of sclerite L3 of male genitalia;
<i>scl.a.</i>	sclerotized area between caudal branches of sclerite R3 of male genitalia;
<i>te.VIII.</i>	tergal process of 8th abdominal tergite;
<i>te.IX.</i>	tergal process of 9th abdominal tergite;
<i>tr.l.</i>	“upper triangular lobe” of right phallomere of male genitalia;
<i>v.I., v.II., v.III.</i>	1st, 2nd and 3rd valves of ovipositor;
<i>v.s.</i>	vestibular sclerite of female genitalia;
<i>X</i>	abdominal tergite X.

TAXONOMIC PART

Tribe Morphinini McKittrick, 1964

Type genus: *Morphna* Shelford, 1910.

Remark: The tribe Morphinini is characterized by the peculiar structure of the right phallomere of the male genitalia (Anisyutkin, 2017). The genera *Placoblatta* Bey-Bienko, 1969 and *Molytria* Stål, 1874 discussed below share this structure with the genus *Morphna* and undoubtedly belong to Morphinini on the basis of their right phallomere structure (Figs 14-15, 30-31).

Genus *Placoblatta* Bey-Bienko, 1969

Type species: *Placoblatta rugosa* Bey-Bienko, 1969, by monotypy.

Remarks: The genus *Placoblatta* was originally monotypic and established on the basis of females from North Vietnam (Bey-Bienko, 1969). The male of the type species was described later (Anisyutkin, 1999). Other species of *Placoblatta* were described from Sri Lanka (see Anisyutkin & Yushkova, 2017) and South Vietnam (see Anisyutkin, 2018b). Thus the genus *Placoblatta* is widely distributed in Asia. It can be assumed that many representatives of this genus are still undescribed.

Species included: *Placoblatta rugosa*, *P. beybienkoi* Anisyutkin, in Anisyutkin & Yushkova, 2017, *P. minor* Anisyutkin, 2018b and *P. semialata* sp. nov.

Placoblatta semialata sp. nov.

Figs 1-20

Etymology: The species name, an adjective, is derived from the Latin words “semi-” (= half) and “alatus” (= winged) and refers to the structure of the male tegmina.

Material examined: MHNG (sample INDO-13/14, GPS25); male holotype; Indonesia, Sulawesi Tengah, Luwuk Utara Regency, Salodik District, road Luwuk-

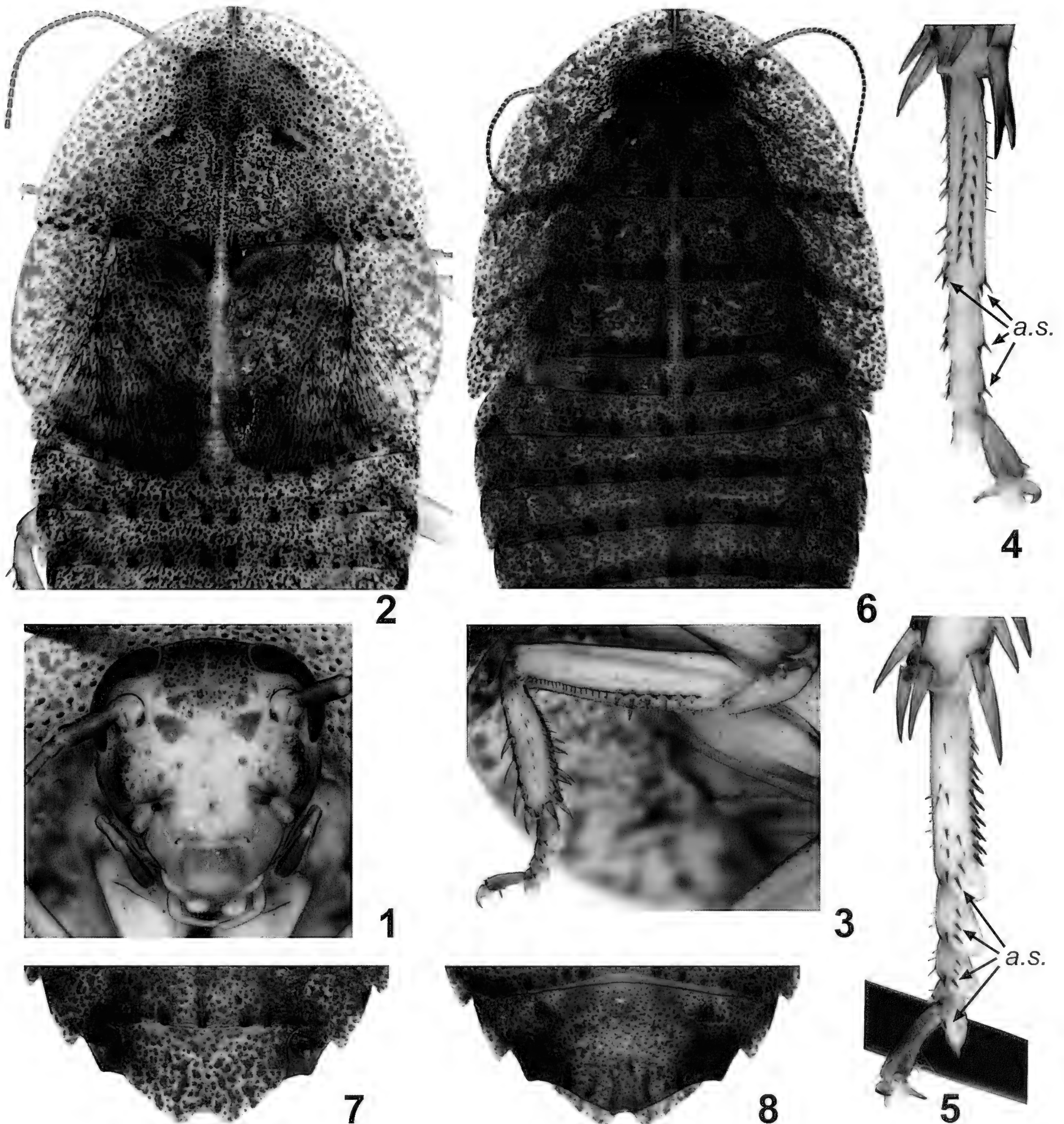
Gua Bolo Poniki, 00°50'27.0"S, 122°52'31.7"E, 416 m, highland primary forest on limestone, sifting; 12.IV.2013; C. Rahmadi & L. Monod leg., permit 88/SIP/FRP/SM/III/2013. – MHNG; 1 female, 1 larva, paratypes; same data as for holotype. – MHNG (sample INDO-13/15, GPS26); 1 male; Sulawesi, Luwuk Barat Regency, Nambo Bosa District, mountains north of Nambo Bosa, 01°02'11.5"S, 122°41'11.4"E, 607 m, highland primary forest on limestone, night collecting, on tree trunks, under logs and in rock crevices; 13.IV.2013; C. Rahmadi & L. Monod leg., permit 88/SIP/FRP/SM/III/2013.

Diagnosis: The new species can be readily distinguished from all other representatives of the genus by its large tegmina which reach the 2nd abdominal tergite. Additionally, *P. semialata* sp. nov. differs from other species of the genus in the following characters: (1) from *P. rugosa* in smaller size, smaller apical euplantula of hind metatarsus (this euplantula occupying more than half of hind metatarsus length in *P. rugosa*, Figs 4-5, cf. Anisyutkin, 1999: fig. 58) and in a long and slender sclerite L3 of the male genitalia (this sclerite short and robust in *P. rugosa*, Fig. 18, cf. Anisyutkin, 1999: figs 65-66); (2) from *P. beybienkoi* in the presence of a well developed rows of spines on the hind metatarsus (tarsal spines absent in *P. beybienkoi*, Figs 4-5, cf. Anisyutkin & Yushkova, 2017: fig. 7C); (3) from *P. minor* in a flat “dorsal outgrowth” of sclerite L2D of the male genitalia (“dorsal outgrowth” ridge-like in *P. minor*, Figs 16-17, cf. Anisyutkin, 2018b: figs 16-21).

Description of male holotype: General colour yellowish, with scattered brown spots (Figs 1-3); facial part of head mostly yellow (Fig. 1); eyes black; antennae with scapus and pedicellum yellowish brown, following approximately ten segments yellow, remaining segments brownish; mouthparts and part of legs yellow (Figs 3-5). Surfaces lustrous; antennae with lustrous proximal 11-12 segments, other segments dull; pronotum densely covered with small tubercles, especially in central part; abdominal tergites with rows of tubercles along caudal margin (Fig. 2); facial part of head with weak punctuation. Head longer than wide, epicranial sutures distinct (Fig. 1); ocellar spots small, weakly expressed; distinct transverse furrow located between antennal sockets; distance between eyes about 0.8 times eye length; distance between antennal sockets about 1.7 of scape length (about 0.8 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.1 : 1.0 : 1.2. Pronotum campaniform, much wider than long, anterior and lateral margins semicircular, posterior margin very weakly protruded caudally (Fig. 2). Meso- and metanotum much wider than long, covered with tegmina (Fig. 2). Tegmina in shape of parallelogram (Fig. 2), reaching 2nd abdominal tergite, venation visible but reduced. Anterior margin of fore femur of type B armament, with 6 spines, apical

spines absent (Fig. 3). Fore tibiae not thickened distally (Fig. 3). Structure of hind tarsi (Figs 4-5): metatarsus a little shorter than other segments combined, with small apical euplantula and two more or less equal rows of spines along lower margin; euplantulae of 2nd to 4th segments large; all euplantulae bordered with 2-3 additional spines (Figs 4-5, *a.s.*) and without spinules;

claws symmetrical and simple; arolium about half of claw length. Fore and mid tarsi similar to hind tarsi, but segments comparatively shorter. Abdominal tergites without visible glandular specializations; posterolateral angles of tergites attenuate and sharp. Anal plate (tergite X) wide, caudal margin widely rounded, with distinct median incision (Fig. 10). Cerci shortened and flattened,



Figs 1-8. *Placoblatta semialata* sp. nov., male holotype (1-5) and female paratype (6-8). (1) Facial part of head. (2, 6) Anterior part of body, dorsal view. (3) Right fore leg, ventral view. (4, 5) Right hind tarsus, ventral (4) and outer (5) view. (7-8) Abdominal apex, dorsal (7) and ventral (8) view. The black parallelogram in Fig. 5 is a pin. Abbreviations: *a.s.* - see chapter "abbreviation used in figures", for details see text. Not to scale.

with segments partly fused (Figs 10-11). Paraprocts of blaberid-type (Fig. 12). Hypandrium nearly symmetrical (Fig. 13), its caudal margin rounded, with a distinct median incision; styli symmetrical and fusiform.

Genitalia (Figs 14-20). Right phallomere (R+N) with caudal part of sclerite R1T subrectangular in shape (Figs 13-14, *c.p.R1T*), densely covered with bristles; R2 distinctly curved; R3 elongated; R4 plate-like; R5 large, fused with sclerite R3. Sclerite L2D (L1) divided into basal and apical parts (Fig. 16); basal part rod-like; apical part rounded, densely covered with recumbent bristles; “dorsal outgrowth” flat (Figs 16-17, *d.o.*). Sclerite L3 (L2d) with basal subsclerite (Fig. 18, *b.L3*) and weak “folded structure”, bristles absent; apex of L3 with “small tooth” (Figs 19-20, *s.t.*); groove *hge* absent. Sclerite L4U (L3d) small and elongated, weakly sclerotized.

Variation in males: Male paratype similar to holotype, but slightly smaller.

Description of female paratype: Similar to males, but different in the following characters. General colour slightly darker (Figs 6-8), facial part of head brownish. Distance between eyes about equal to eye length; distance between antennal sockets about 1.6 of scape length (about 0.8 mm). Tegmina and wings completely absent. Anterior margin of fore femur with 5-6 spines, 1 apical spine present on left femora. Abdominal apex as in Figs 7-8. Genital plate wide, caudally rounded (Fig. 8).

Description of larva paratype: Similar to adult female, but smaller and lighter in colour.

Measurements (in mm; measurements in parenthesis are those of holotype): Head length: male 2.9-3.0 (3.0), female 2.8; head width: male 2.5-2.7 (2.7), female 2.6; pronotum length: male 5.0 (5.0), female 4.5; pronotum width: male 8.3-8.4 (8.4), female 8.1; tegmen length: male 4.8-5.0 (4.8); tegmen width: male 4.3-4.7 (4.7).

Genus *Molytria* Stål, 1874

Type species: *Epilampra inquinata* Stål, 1860, by monotypy.

Remarks: This genus was originally monotypic and established for *Epilampra inquinata* from Sidney, Australia (Stål, 1860). The original diagnosis of the genus was based on the structure of the hind tarsus: “*planta nuda articuli primi tarsorum posticorum per magnam partem articuli extensa*” (Stål, 1874: 12). Later two additional species were described: *M. perplexa* Shelford, 1910 from Victoria, Gippsland (Shelford, 1910) and *M. vegrandia* Roth, 1999 from New South Wales (Roth, 1999). The genus was reviewed by L. Roth (1999). The wing venation of a *Molytria* sp. was illustrated in details by Cui *et al.* (2018).

The genus *Molytria* is similar to the genus *Morphna*

in the presence of large euplantulae along the lower margin of the hind tarsi and in the structure of its female genitalia, i.e. widely rounded and medially divided basivalvula (Figs 23-24 cf. Anisyutkin, 2018a: figs 21-23) and vestibular sclerite with median outgrowth and lateral branches (Fig. 23 cf. Anisyutkin, 2018a: figs 21-24). The short-winged species from India and Sri Lanka [*Morphna decolyi* (Bolivar, 1897), *M. indica* Anisyutkin, in Anisyutkin & Yushkova, 2017 and *M. srilankensis* Anisyutkin, in Anisyutkin & Yushkova, 2017] are in their habitus very similar to females of the genus *Molytria*. However, both genera can be distinguished by the presence of two distinct rows of spines in the basal part of the metatarsus in *Molytria* (Figs 25-26; these spines are absent or vestigial in *Morphna*) and by the absence of a dorsal outgrowth in the apical part of sclerite L2D of the male genitalia in *Molytria* [Fig. 32; this structure is present in representatives of *Morphna* (see Anisyutkin, 2018a: figs 34-39)].

Species included: Three species from Australia (South Australia, New South Wales, Victoria and Tasmania), as given in Beccaloni (2014).

Molytria inquinata (Stål, 1860)

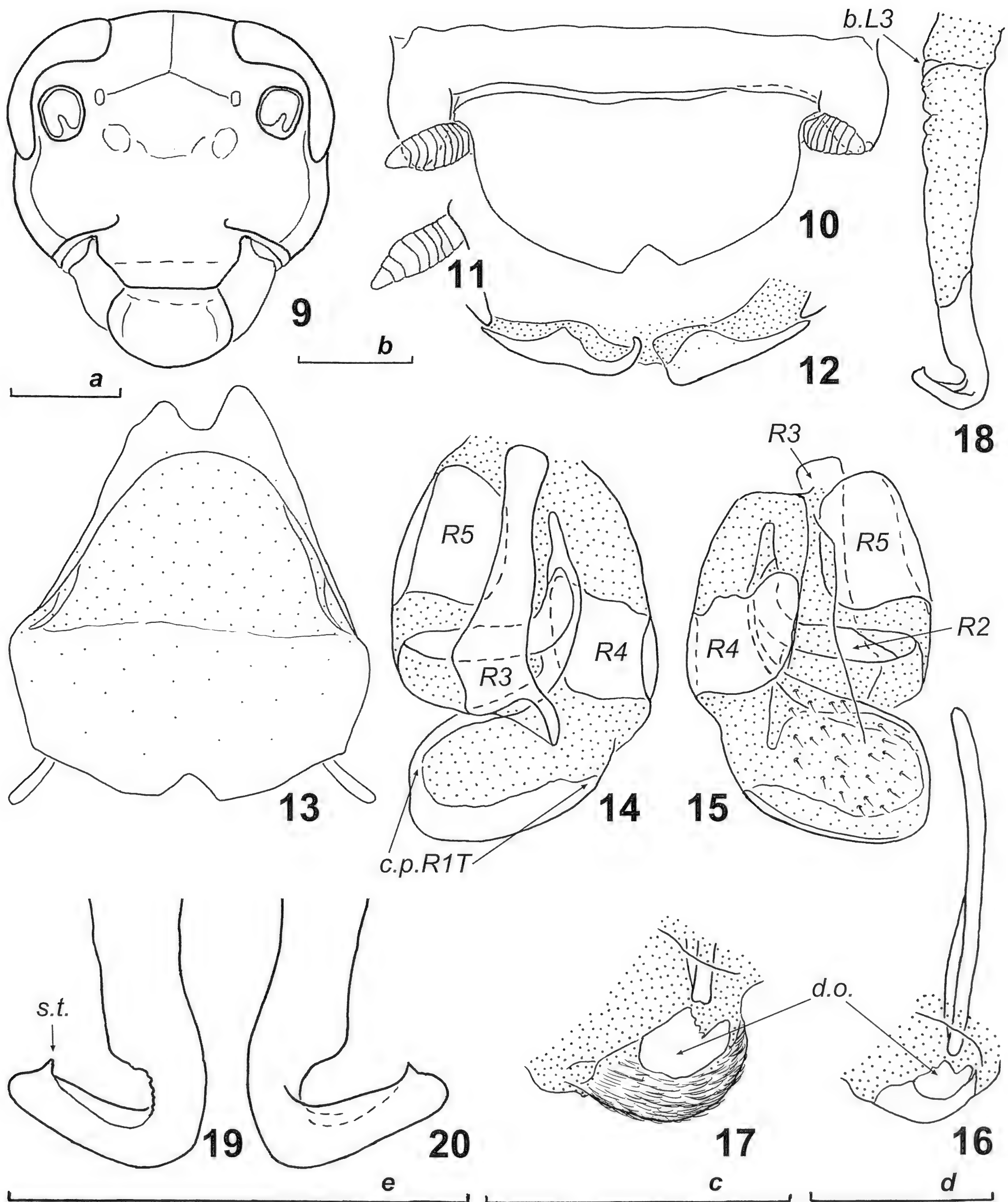
Figs 21-24

Material examined: ZIN; 1 female; “Australia, East Karajong [sic!], under log in bush; 7.VI.1959; M. Nikitin”, “Australia *Molytria inquinata* Stal”, genital complex in prep. 151119/01. – ZIN; 1 female; Australia, Queensland, Brisbane; 21.II.1969; leg. Plechanov.

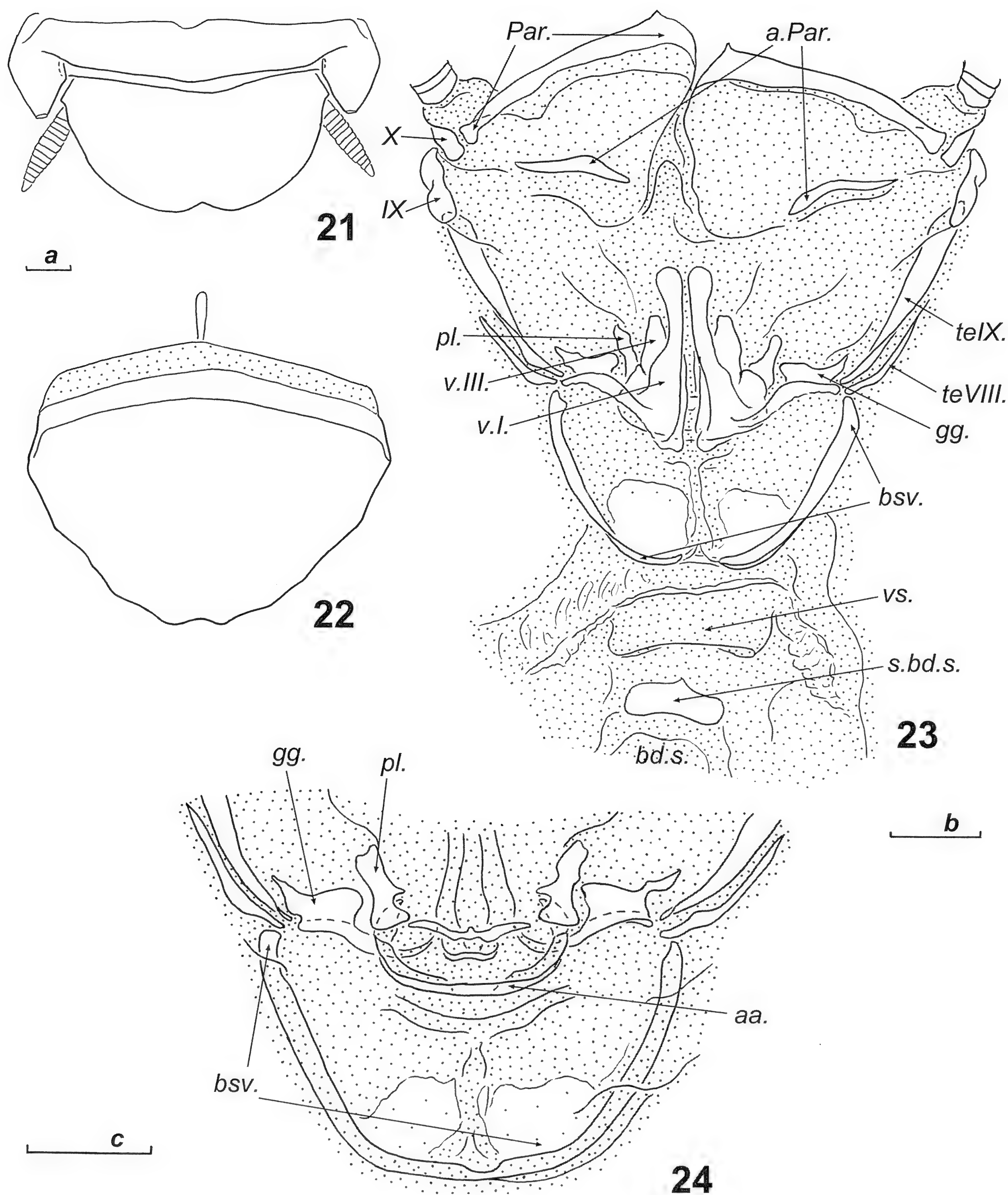
The first label was written in Russian, with the exception of “East Karajong” and “under log in bush” which were given in English. “Karajong” is probably Kurrajong, a small town in New South Wales. The second label was all written in Russian.

Details: Head rounded; distance between eyes 0.8-0.9 times eye length; distance between antennal sockets about 1.8 times scape length (~1.3 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.0-1.1 : 1.0 : 1.4. Fore tibiae not thickened distally. Anterior margin of fore femora of type B armament, with 9 spines, including 2 apical one. Tibial spines well developed. “Additional spines” bordering euplantulae of 2nd to 3rd segments on inner and outer side present. Anal plate (tergite X) wider than long and widely rounded, with weak medial incision on hind margin (Fig. 21). Cerci short and slender, with distinct segments (Fig. 21). Genital plate wide, sinuate along hind margin (Fig. 22).

Ovipositor and adjacent structures (Figs 23-24): Paraprocts with isolated anterior sclerites (Fig. 23, *a.Par.*). Intercalary sclerite absent. Tergal processes of abdominal segment VIII short, not reaching paratergites of tergite VIII (Fig. 23, *teVIII.*); tergal processes of



Figs 9-20. *Placoblatta semialata* sp. nov., male holotype. (9) Facial part of head. (10) Abdominal apex, dorsal view. (11) Left cercus, dorsal view. (12) Paraprocts, ventral view. (13) Hypandrium, ventral view. (14-15) Right phallomere, ventral (14) and dorsal (15) view. (16) Sclerite L2D, dorsal view. (17) Apical part of sclerite L2D, dorsal view. (18) Sclerite L3. (19-20) Apex of sclerite L3. Dotted areas show membranous parts. Bristles are not shown in Fig. 16. Abbreviations: *b.L3*, *c.p.R1T*, *d.o.*, *R2*, *R3*, *R4*, *R5*, *s.t.* - see chapter "abbreviation used in figures", for details see text. Scale bars 1 mm: a (9), b (10-13), c (14-15, 17), d (16, 18), e (19-20).



Figs 21-24. *Molytria inquinata* (Stål, 1860), female. (21) Abdominal apex, dorsal view. (22) Genital plate, ventral view. (23) Abdominal apex, ventral view, genital plate removed. (24) Basal part of ovipositor, dorsal view. Dotted areas show membranous parts, except for valves of ovipositor. Abbreviations: *aa.*, *a.Par.*, *bd.s.*, *bsv.*, *gg.*, *Par.*, *pl.*, *s.bd.s.*, *te.VIII.*, *telX.*, *v.I.*, *v.II.*, *v.III.*, *vs.* - see chapter "abbreviation used in figures"; *IX*, *X* - abdominal tergites IX-X, for details see text. Scale bars 1 mm: a (21-22), b (23), c (24).

abdominal segment IX fully developed (Fig. 23, *teIX*). Gonangulum well sclerotized (Figs 23-24, *gg*). All valves of ovipositor weakly sclerotized. First valves large, membranous at apex, with numerous setae along inner side (Fig. 23, *v.I*, setae not shown). Base of 2nd and 3rd pairs of valves as in Fig. 24, sclerotized lobes well developed and elongated (Fig. 24, *pl*). Anterior arch of second valvifer as in Fig. 24, *a.a*. Second valves of ovipositor small, completely hidden under first valves. Third valves of ovipositor (gonopods) widened (Fig. 23, *v.III*). Basivalvula in shape of slightly asymmetrical, widely rounded and partly sclerotized plate, partly divided medially (Figs 23-24, *bsv*). Vestibular sclerite weakly sclerotized, with long lateral branches (Fig. 23, *vs*). Brood sac (Fig. 23, *bd.s*) with distinct wider than long sclerite (Fig. 23, *s.bd.s*).

Measurements (in mm): Head length 5.2-5.4, head width 5.0-5.3; pronotum length 8.0-8.5, pronotum width 12.0-12.5; tegmen length 11.5, tegmen width 9.0.

Molytria vegranda Roth, 1999

Figs 25-35

Material examined: MHNG; 1 male; Australia, New South Wales, Jenolan; 15-20.I.1995; G. Henrgag. – MHNG; 1 female with same data as for male.

Redescription of male (Figs 25-35): The original description of Roth (1999) can be supplemented with the following details. Head with facial part dark, upper part about above ocelli, vertex and occiput black. Interocular space about as long as width between antennal sockets (~1.9 mm); distance between eyes about 0.8 times eye length; distance between antennal sockets about 1.7 of scape length (about 1.1 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.1 : 1.0 : 1.5. Fore tibiae not thickened distally. Anterior margin of fore femora of type B armament, with 5-6 spines, including 1 apical one. Tibial spines well developed. Structure of hind tarsi (Figs 25-26): metatarsus slightly shorter than other segments combined, with large euplantulae occupying about half of metatarsus length, two more or less equal rows of spines located in proximal part of metatarsus; euplantulae of 2nd to 4th segments large; euplantulae of 1st to 3rd segments bordered with 1-2 additional spines (Figs 25-26, *a.s*); claws symmetrical and simple; arolium about half of claw length. Fore and mid tarsi generally similar to hind tarsi, but segments comparatively shorter; fore tarsi without spines; metatarsus of mid tarsi with short rows of spines. Anal plate as in Fig. 27. Hypandrium nearly symmetrical (Figs 28-29), with caudal margin rounded, without median incision; styli symmetrical and fusiform.

Genitalia (Figs 29-35). Right phallomere (R+N) with caudal part of sclerite R1T rounded at caudolateral angle

(Figs 30-31, *c.p.R1T*), densely covered with bristles; R2 distinctly curved; R3 elongated and curved, area between caudal branches sclerotized (Fig. 30, *scl.a*); R4 plate-like; R5 large, fused with sclerite R3. Sclerite L2D (L1) divided into basal (Fig. 29, *b.L2D*) and apical parts (Figs 29-32); basal part rod-like, distinctly widened cranially, with two lateral outgrowths caudally (Fig. 32); apical part elongated, densely covered with recumbent bristles; “dorsal outgrowths” absent. Sclerite L3 (L2d) with basal subsclerite (Fig. 33, *b.L3*) and “folded structure” (Fig. 33, *f.s*), bristles weak; apex of L3 with well developed “small tooth” (Figs 33-35, *s.t*); groove *hge* absent. Sclerite L4U (L3d) large and transverse (Fig. 29).

Redescription of female: The original description of Roth (1999) can be supplemented with the following details. Head more rounded and eyes and ocelli smaller than in male; distance between eyes about as long as eye length; distance between antennal sockets about 2.2 of scape length (about 1.0 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.1 : 1.0 : 1.4. Structure of legs similar to that of male.

Measurements (in mm): Head length: male 4.2, female 4.6; head width: male 4.0, female 4.5; pronotum length: male 6.3, female 7.1; pronotum width: male 8.2, female 10.3; tegmen length: male 27.0, female 7.5; tegmen width: male 8.5, female 7.2.

Tribe Poroblattini Roth, 1971

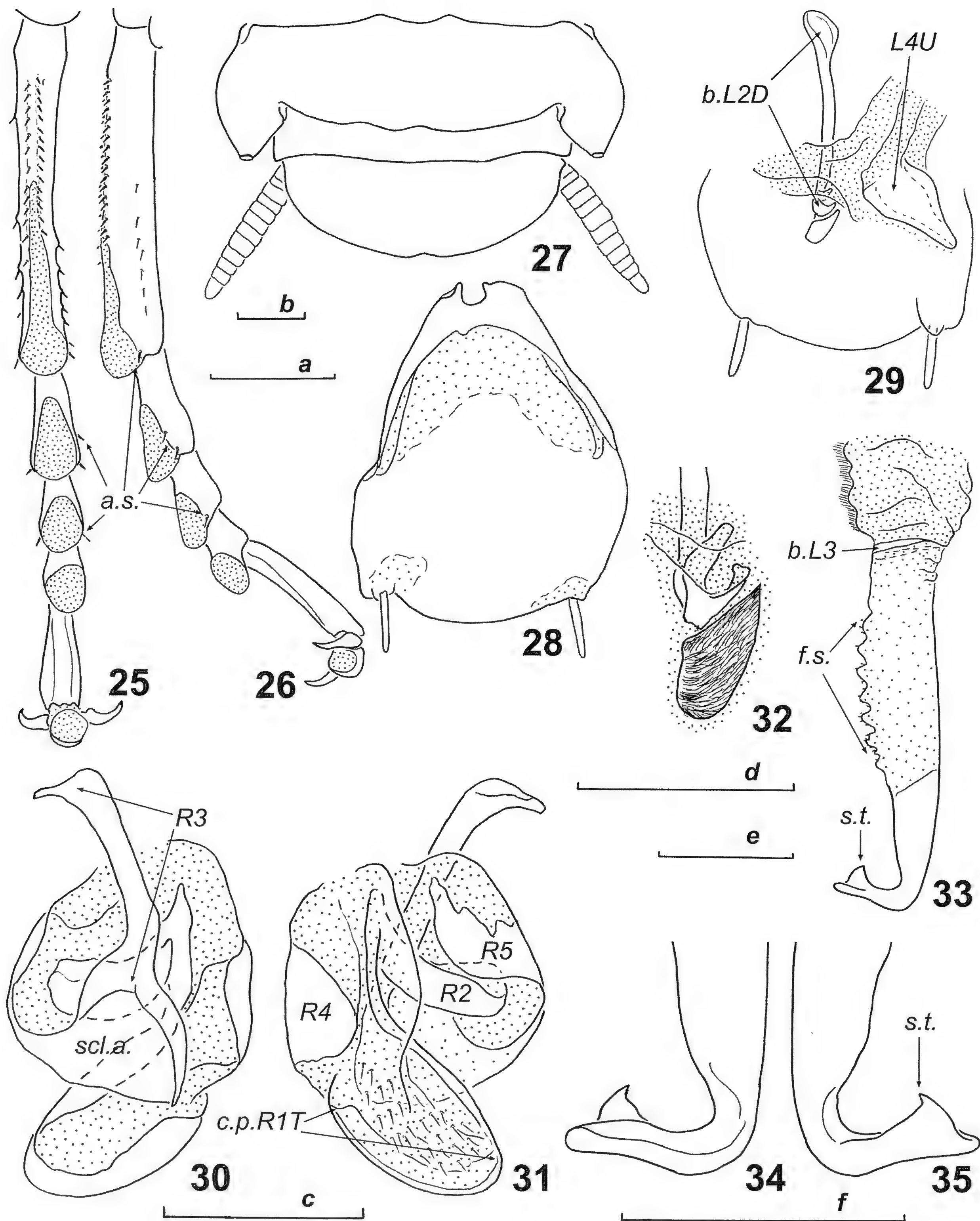
Notolamprini Roth, 1971, syn. nov.

Colapteroblattini Roth & Gutiérrez, 1998, syn. nov.

Type genus: *Colapteroblatta* Hebard, 1919.

Remarks: The tribes Poroblattini and Notolamprini were described in the same paper (Roth, 1971). The first tribe originally included the genera *Poroblatta* Hebard, 1919, *Nauclydas* Rehn, 1930, *Galiblatta* Hebard, 1927, *Dryadoblatta* Rehn, 1930, and *Colapteroblatta*, the second tribe was monotypic (Roth, 1971). Later, the genera *Poroblatta*, *Acroporoblatta* and *Nauclydas* were synonymized under *Colapteroblatta* and the name Poroblattini was replaced with Colapteroblattini: “Because of synonymy this tribe should be called Colapteroblattini” (Roth & Gutiérrez, 1998: 171). This replacement is incorrect because of article 40.1. of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999): “Validity of family-group names not affected. When the name of a type genus of a nominal family-group taxon is considered to be a junior synonym of the name of another nominal genus, the family-group name is not to be replaced on that account alone”. Thus I consider Colapteroblattini syn. nov. as a junior synonym of Poroblattini.

The tribe Poroblattini is based on characters of the male



Figs 25-35. *Molytria vegranda* Roth, 1999, male. (25-26) Left hind tarsus, ventral (25) and inner (26) view. (27) Abdominal apex, dorsal view. (28) Hypandrium, ventral view. (29) Sclerites L2D, L4U and outlines of caudal part of hypandrium, dorsal view. (30-31) Right phallomere, ventral (30) and dorsal (31) view. (32) Apical part of sclerite L2D, dorsal view. (33) Sclerite L3. (34, 35) Apex of sclerite L3. Dotted areas show membranous parts. Abbreviations: *a.s.*, *b.L2D*, *b.L3*, *c.p.R1T*, *f.s.*, *L4U*, *R2*, *R3*, *R4*, *R5*, *s.t.*, *scl.a.* - see chapter "abbreviation used in figures", for details see text. Scale bars 1 mm: a (24-25), b (27-29), c (30-31), d (32), e (33), f (34-35).

genitalia: “In this tribe the L2d (i.e. apical part of sclerite L2D in present paper) is elongated, curved, sclerotized, tapers slightly toward the tip, and is separated from L2vm (i.e. basal part of sclerite L2D in present paper). Apparently there is no distinct prepuce (i.e. membrane with bristles or teeth or apical sclerite of apical part of sclerite L2D). The R2 has a subapical incision and the shapes of L1 (i.e. right phallomere in present paper) are all basically similar” (Roth, 1971: 181).

Roth did not give a clear definition of the tribe Notolamprini. It was noted “that the 3 species of *Notolampra* have a markedly convex dorsal surface” (Roth, 1971: 181) and some morphological differences and peculiarities in male genitalia structures: “In *N. gibba* ... the L2d is much more robust than the L2d of members of Poroblattini, and does not taper toward the apex. R1 (i.e. sclerite L3 in present paper) is long and slender and has a subapical incision; L1 differs in shape from L1 of Poroblattini” (Roth, 1971: 181).

It must be noted that Roth examined the male genitalia structures mounted on slides (Roth, 1971; Roth & Gutiérrez, 1998). This made it difficult to study fine morphological structures.

In my opinion, *Colapteroblatta compsa* Hebard, 1919 (the type species of *Colapteroblatta*) and *Notolampra gibba* (Thunberg, 1826) (the type species of *Notolampra*) have structurally very similar male genitalia. The differences mentioned by Roth (1971) are not substantial.

The type species of *Colapteroblatta* and *Notolampra* have a number of characters in common:

1. Structure of tarsi: metatarsus distinctly shorter than other tarsal segments combined, with large euplantula; spines absent.
2. Hypandrium (Fig. 41 cf. Anisyutkin, 2018a: fig. 90) asymmetrical, with membranous area along right side; styli asymmetrical and cylindrical.
3. Structure of right phallomere (Figs 42-43 cf. Anisyutkin, 2018a: figs 91-92): caudal part of sclerite R1T distinctly enlarged; “upper triangular lobe” present; R3 short and robust, widened caudally.
4. Apical part of sclerite L2D developed as flattened, elongated and plate-like sclerite; bristles absent (Figs 44-46 cf. Anisyutkin, 2018a: figs 93-95).

Taking into account the aforesaid, I consider the tribe Notolamprini syn. nov. as a junior synonym of Poroblattini.

The features listed above are probably characteristic of the tribe Poroblattini, but I prefer to postpone proposing a formal revised diagnosis of this tribe due to insufficient knowledge of other epilamprine taxa.

Genus *Notolampra* Saussure, 1862

Type species: *Epilampra lucida* Saussure, 1862 (junior synonym of *Blatta gibba* Thunberg, 1826), by monotypy.

Remarks: According to structures of the male genitalia

the type species is similar to representatives of the genus *Colapteroblatta* (see above), whereas its habitus is similar to that of *Thorax pocellana* (Saussure, 1862), the type and so far only species of the genus *Thorax* Saussure, 1862. The male genitalia of *Thorax* (see Anisyutkin, 2014), however, clearly differ from those of *Notolampra* and *Colapteroblatta*. I assume that the similarity in the appearance of *Notolampra* and *Thorax* is due to convergence.

Species included: Three species from South America (Brazil, Surinam, French Guiana, Martinique, Trinidad and Tobago), as given in Beccaloni (2014).

Notolampra gibba (Thunberg, 1826)

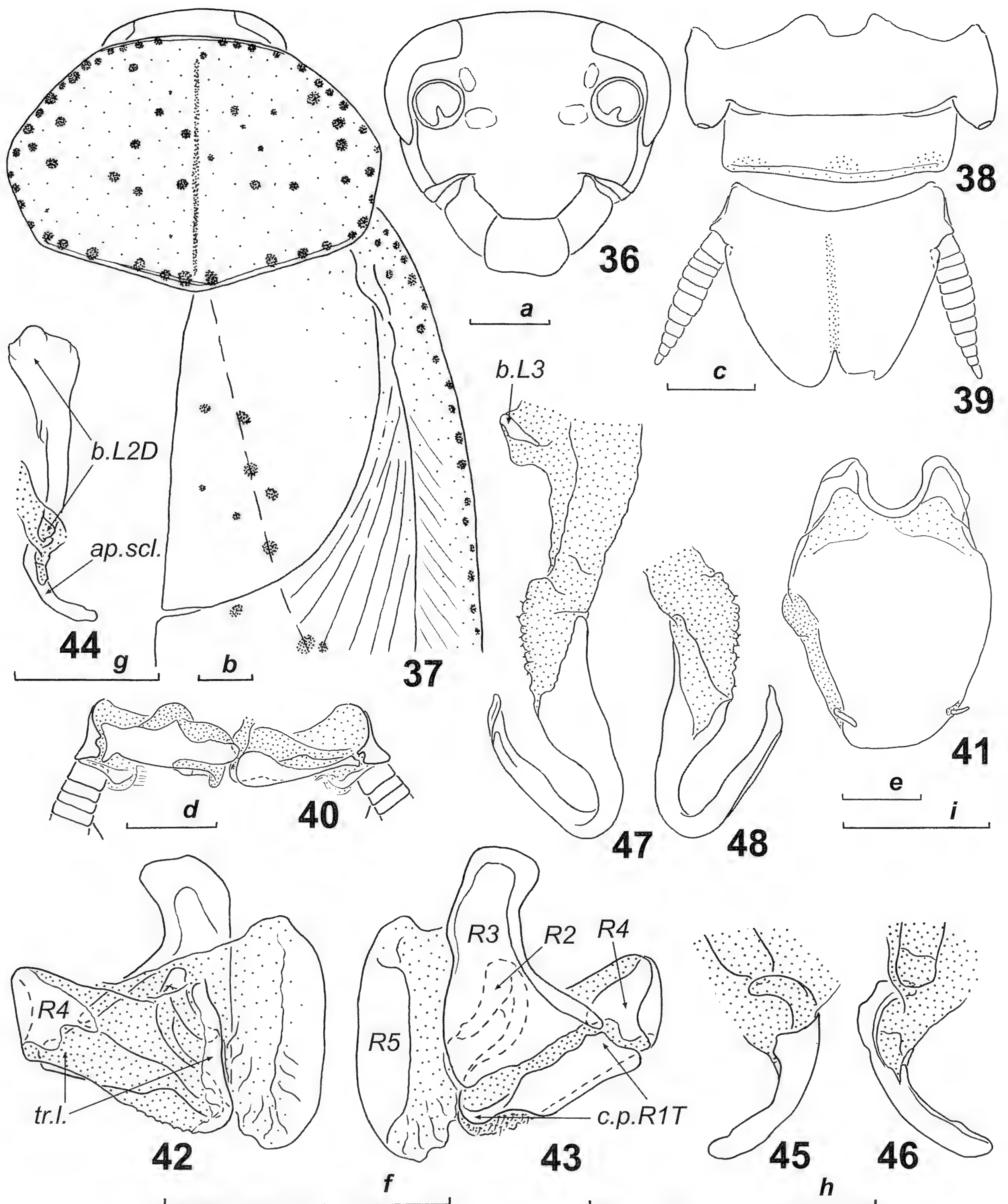
Figs 36-52

Notolampra lucida Saussure, 1862

Phoraspis cassidea Burmeister, 1838 (nec Dalman, 1823)

Material examined: MHNG; 1 male; “Bahia, Brésil; M H de Saussure”, “*Thorax cassidea* ♂ Burm.”. – ZIN; 1 female; Brazil, “Aqua Preta 22.9.936”, “2247”, “*Notolampra gibba* Thnb.”. – ZIN; 1 female; “Bahia”, “*Notolampra gibba*, Thunb. = cassidea, Burm.” / “~~*Phoraspis cassidea* Burm.~~” (The crossed out identification is written on the back of the label), “R. Shelford det.”.

Redescription of male (Figs 36-48): General colour dirty yellow, head, pronotum and tegmina with scattered black dots (Fig. 37), middle legs, coxae of hind legs (other parts of hind legs missing) and ventral side of abdomen blackish. Surfaces smooth and lustrous; antennae with lustrous proximal 10-13 segments, other segments dull; head with large sparse punctuation, pronotum and, to a lesser degree, tegmina with fine dense punctuation. Head wider than long, epicranial sutures absent (Fig. 36); ocellar spots small, weakly expressed; distance between eyes about 1.1 times eye length; distance between antennal sockets about twice scape length (0.8 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.0 : 1.0 : 1.1. Pronotum as in Fig. 37. Tegmina and wings completely developed (left tegmen missing), surpassing abdominal apex. Tegmina strongly sclerotized and convex, venation strongly reduced (Fig. 37), in distal half better developed than in proximal half; area of right tegmen overlapped by left one at rest and distinctly reticulate. Anterior margin of fore femur armed as in type B, with 2-4 spines, including 1-2 apical ones. Fore tibiae not thickened distally. Hind and left mid legs broken off. Structure of mid tarsi: metatarsus half as long as other segments combined, with large euplantulae along lower margin; euplantulae of 2nd to 4th tarsal segments large; spines absent; claws symmetrical and simple; arolium large, slightly shorter than claw. Fore tarsi similar to mid tarsi, but segments relatively shorter. Abdominal tergites without visible glandular specializations;

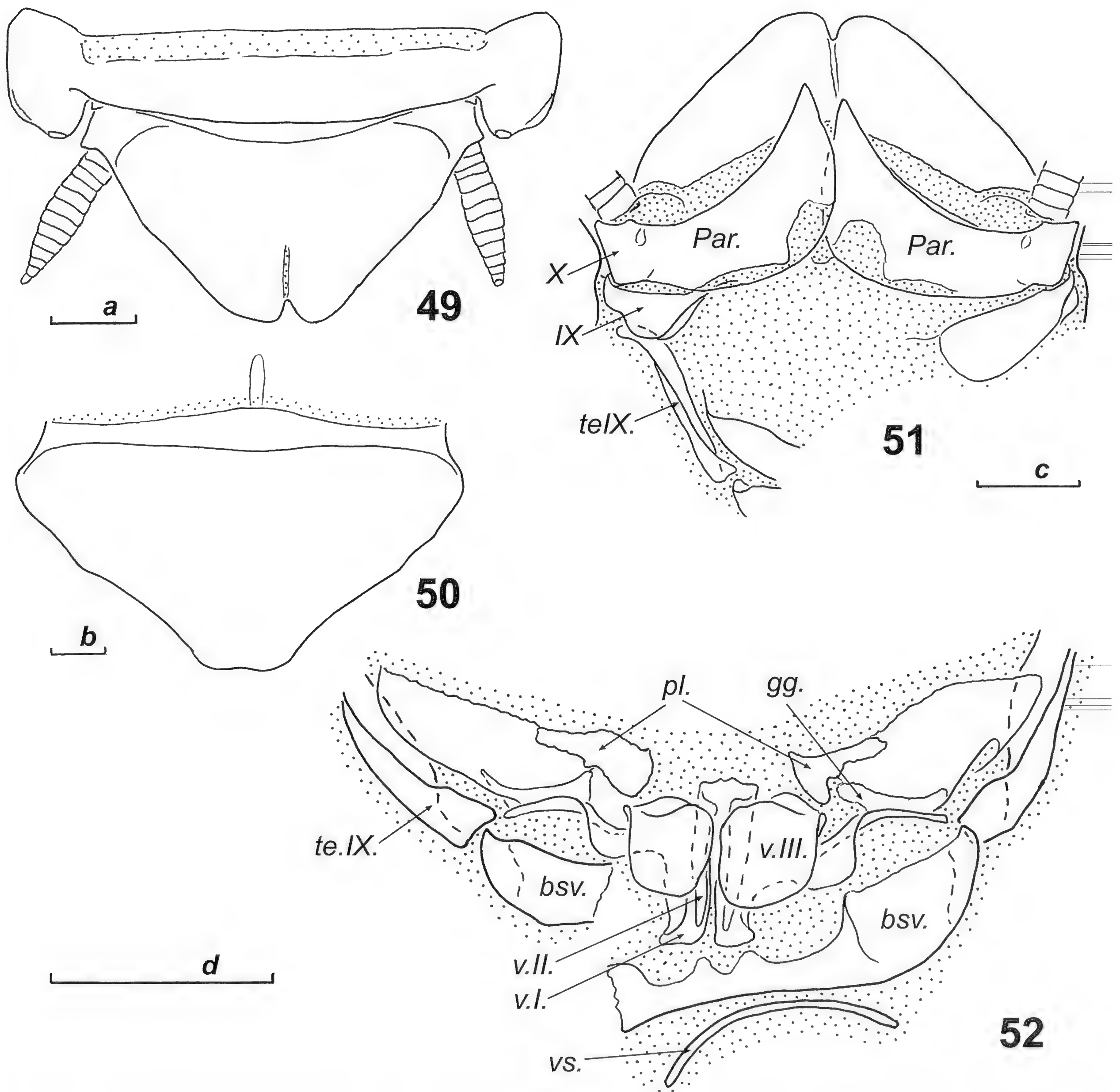


Figs 36-48. *Notolampra gibba* (Thunberg, 1826), male. (36) Facial part of head. (37) Head, pronotum and basal part of left tegmen, dorsal view. (38) Abdominal tergites VIII-IX, dorsal view. (39) Abdominal apex, dorsal view. (40) Paraprocts and adjacent structures, ventral view. (41) Hypandrium, ventral view. (42-43) Right phallomere, dorsal (42) and ventral (43) view. (44) Sclerite L2D, dorsal view. (45-46) Apical part of sclerite L2D, ventral (45) and dorsal (46) view. (47) Sclerite L3. (48) Apex of sclerite L3. Dotted areas show dark colour (37) or membranous parts (38-48). Abbreviations: *ap.scl.*, *b.L2D*, *b.L3*, *c.p.R1T*, *R2*, *R3*, *R4*, *R5*, *tr.l.* - see chapter "abbreviation used in figures", for details see text. Scale bars 1 mm: a (36), b (37), c (38-39), d (40), e (41), f (42-43), g (44), h (45-46), i (47-48).

posterolateral angles of tergites attenuate and sharp. Anal plate (tergite X) elongated, with large median incision (Fig. 39). Cerci shortened and flattened (Fig. 39). Paraprocts of blaberid-type (Fig. 40). Hypandrium elongated and asymmetrical (Fig. 41), with membranous area along right margin; styli asymmetrical and cylindrical.

Male genitalia (Figs 42-48): Right phallomere (R+N): caudal part of sclerite R1T well sclerotized, enlarged (Figs 42-43, *c.p.R1T*), dorsally with large and medially sclerotized "upper triangular lobe" (Fig. 42, *tr.l.*) densely

covered with bristles; R2 curved, with weakly expressed hollow; R3 short and robust, widened caudally; R4 plate-like; R5 in shape of large weakly sclerotized lobe, fused with R2. Sclerite L2D (L1) divided into basal and apical parts (Fig. 44); basal part strongly widened cranially; apical part in shape of flattened and curved plate (Figs 44-46), "dorsal outgrowth" and bristles absent. Sclerite L3 (L2d) with basal subsclerite (Fig. 47, *b.L3*); "folded structure" distinct, with short bristles (Figs 47-48); apex of L3 attenuated; groove *hge* present. Sclerite L4U (L3d) small, very weakly sclerotized.



Figs 49-52. *Notolampra gibba* (Thunberg, 1826), female. (49) Abdominal apex, dorsal view. (50) Genital plate, ventral view. (51) Abdominal apex and right tergal processes, ventral view. (52) Ovipositor and adjacent structures, ventral view, basivalvula broken. Dotted areas show membranous parts, except for valves of ovipositor. Abbreviations: *bsv.*, *gg.*, *Par.*, *pl.*, *teIX.*, *v.I.*, *v.II.*, *v.III.*, *vs.* - see chapter "abbreviation used in figures", for details see text. Scale bars 1 mm: a (49), b (50), c (51), d (52).

Redescription of female (Figs 49-52): Similar to male, but larger, more robust and more convex. Facial part of head with scattered black dots, eyes black. Head with distance between eyes 1.2 times eye length; distance between antennal sockets about 1.8 times scape length (~1.2-1.3 mm); approximate ratio of lengths of 3rd to 5th segments of maxillary palps 1.1-1.2 : 1.0 : 1.1-1.2. Tegmina with venation nearly indistinct, main veins (*Sc*, *R*, *CuP*) visible as indistinct swellings. Anterior margin of fore femur armed as in type B, with 3-5 spines, including 2 apical ones. Anal plate (X tergite) triangular in shape, with distinct median incision (Fig. 49). Paratergites of tergite IX large and plate-like (Fig. 51). Paraprocts fused with anal plate, tapered and sclerotized caudally (Fig. 51). Genital plate as in Fig. 50.

Ovipositor and adjacent structures (Figs 51-52): Intercalary sclerite absent. Tergal processes of abdominal segment VIII small and fused with tergal processes of abdominal segment IX, the latter fully developed (Figs 51-52, *teIX*). Gonangulum well sclerotized (Fig. 52, *gg.*), fused with well developed sclerotized lobes (Fig. 52, *pl.*). First valves of ovipositor large, partly membranous, with setae along inner side (Fig. 52, *v.I.*, setae not shown). Second valves of ovipositor small, completely hidden under first valves (Fig. 52, *v.II.*). Third valves of ovipositor (gonoplasts) wide (Fig. 52, *v.III.*). Basivalvula in shape of transverse arch-like plate (Fig. 52, *bsv.*). Vestibular sclerite in shape of thin and curved strip (Fig. 52, *vs.*). Brood sac without sclerotized structures.

Measurements (in mm): Head length: male 3.1, female 4.6-4.9; head width: male 3.3, female 4.3-4.6; pronotum length: male 4.5, female 6.2-6.7; pronotum width: male 6.1, female 8.5-9.2; tegmen length: male <16.0 (apices of tegmina and wings broken), female 19.5-20.5; tegmen width: male 6.0, female 9.0-9.5.

Remarks: The specimens described above and the specimen determined as *N. gibba* in a paper by Roth (1971) have different shapes of the apical part of sclerite L2D (Figs 44-46 cf. Roth, 1971: fig. 27). This can be explained by different angles of view, or the specimens may belong to different species.

The descriptions of ovipositor and adjacent structures are incomplete due to insufficient conspecific material. Note that in Fig. 52 the ovipositor is in such a position that the third valves cover the first and second ones. Only two females of this species were at the disposal of the author. One of them has a missing abdomen, while the other has damaged genitalia (Figs 51-52).

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**Description of the male of *Lepidotrigona nitidiventris* (Smith, 1857),
redescription of the female holotype and additional morphological data on the workers
(Hymenoptera: Apidae: Meliponini)**

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Abstract: We describe for the first time the male of *Lepidotrigona nitidiventris* (Smith, 1857), emphasizing the structure of the male genital capsule and metasomal sterna four through seven. Our identification of the male as *L. nitidiventris* is based on our examination of the worker holotype (type locality Mt. Ophir, Peninsular Malaysia) which we found to match workers from the same nest as males found in western Thailand. The species belongs to the *L. nitidiventris* species group, comprising *L. latipes* (Friese), *L. palavanica* (Cockerell), *L. trochanterica* (Cockerell), with *L. nitidiventris* as the type species of the genus. No males of these species were previously known. We examined the holotype workers of the three other species and confirm all four as clearly different species. We propose, however, that the obviously smaller *L. palavanica* should not be included in the large-sized group of *Lepidotrigona*.

Keywords: Genitalia - morphology - stingless bees - taxonomy - Malaysia - Thailand.

INTRODUCTION

Stingless bees (Meliponini) are advanced eusocial insects (Michener, 1974; Quezada-Euán, 2018) and are among the most important pollinators in tropical and subtropical habitats (Roubik, 1989; Heard, 1999). Honey and propolis from stingless bees have been valuable for medicinal purposes since ancient times (Dardón & Enríquez, 2008; Umthong *et al.*, 2009; Vit *et al.*, 2013; Campos *et al.*, 2014; Ávila *et al.*, 2018). In Thailand, *Lepidotrigona* Schwarz, 1939 is one of the most important genera not only because of their pollination activities but also because their honey has a higher sugar content compared to other Thai stingless bees, the honey of which is often rather sour (Chuttong *et al.*, 2016). *Lepidotrigona nitidiventris* (Smith, 1857) was designated as the type species of the subgenus *Lepidotrigona* (under the genus *Trigona*) by Schwarz (1939). *Lepidotrigona* can be differentiated from other Old World genera of meliponines classified in *Trigona* sensu lato by the

tessellate microsculpture on the head, mesosoma, and apical metasomal terga, and by the greatly expanded metatibia of workers (Schwarz, 1939). After Rasmussen & Cameron (2010) determined that Old World *Trigona* are genetically divergent from New World *Trigona* sensu stricto, *Lepidotrigona* was elevated to generic level; thus *L. nitidiventris* is the type species of the genus. *Lepidotrigona* has been divided into three groups based primarily on size (Schwarz, 1939; Rasmussen, 2008, 2013). This classification was followed by Attasopa *et al.* (2018). The groups are the small *L. “ventralis”*, the mid-size *L. “terminata”* and the large *L. “nitidiventris”* groups according to the length of body and forewing. Species level separation involves a combination of body size, colour of integument on metasomal terga, colour of hairs on the head and mesosoma (Schwarz, 1939; Sakagami, 1975). There are also differences among species and species groups in the male genitalia (Attasopa *et al.*, 2018) although males are not known for all species. As is

often the case with stingless bees, morphometrics is often necessary to confirm species identity (Sakagami, 1975; Koch, 2010; Hurtado-Burillo *et al.*, 2016; Rattanawanee *et al.*, 2017; Attasopa *et al.*, 2018; Ndungu *et al.*, 2018). Among the three species groups within *Lepidotrigona*, the *L. nitidiventris* group (Rasmussen, 2008) has the largest body size. The members of the group are very rare and its taxonomy still mostly unresolved. Moreover, some species names in the *L. nitidiventris* group have been used differently by different authors. For instance, *L. palavanica* (Cockerell, 1915) was considered as a synonym of *L. nitidiventris* by Schwarz (1939), while Rasmussen (2008) considered it as a separate species within the *L. nitidiventris* species group. Another example is *L. trochanterica* (Cockerell, 1920), assumed to be a variety of *L. nitidiventris* by Schwarz (1939), but raised subsequently to full species level by Rasmussen (2008). In Thailand, so far only one species of this group has been reported, namely *L. nitidiventris*, based on workers. Workers of the species have been reported throughout many countries in South East Asia by many authors [see citations in Rasmussen (2008) which also includes non-taxonomic papers]. However, no male in the species group has yet been described.

In the course of studies on the nest entrance architecture and feeding behaviour of meliponines in Thailand (e.g. Bänziger, 2018), HB found workers and some males emerging from nests with the same trumpet-like nest entrance as built by *Lepidotrigona* (Bänziger *et al.*, 2011: figs 8, 9). The workers were readily recognized by their large size and faint yellowish wings as belonging to the *L. nitidiventris* group. Because of the importance of these males, a detailed examination of the holotype of *L. nitidiventris* was carried out by KA and compared to workers of the nest in mention. Here we re-describe the holotype worker of *L. nitidiventris* and describe the male of the species for the first time. Data on the taxa of the *L. nitidiventris* species group are also briefly analysed and differences among the species are provided along with a discussion.

MATERIALS AND METHODS

Two nests of the species, labelled as UP45 and UP88, were found around 6 km away from each other near Umphang, Tak Province, western Thailand. Workers (females) and males were captured when exiting nest UP88. No males were seen exiting nest UP45. Specimen preservation and male genitalia dissection methods follow the procedures of Attasopa *et al.* (2018). One male and one worker from nest UP88 were deposited in the Muséum d'histoire naturelle de Genève, Switzerland (MHNG), the remaining specimens are with HB at the Department of Entomology and Plant Pathology, Faculty of Agriculture, Chiang Mai University (BCMU). The type material of *L. nitidiventris* was borrowed from

the Oxford University Museum of Natural History, Oxford, United Kingdom (OUMNH). Types of other species of the group were borrowed from the Natural History Museum, London, United Kingdom (NHMUK) and Museum für Naturkunde, Berlin, Germany (ZMB) (details below). The holotype of *L. nitidiventris* and Thai specimens were examined morphologically under a Nikon SMZ1500 stereomicroscope and measurements were taken with an ocular micrometer (calibrated with a stage micrometer). The metatibial ratio, as used in our analysis, is the maximum width of the metatibia compared to its maximum length (see fig. 1C in Attasopa *et al.*, 2018). Images were taken at PCYU (the Packer Collection at York University, Toronto, Ontario, Canada, using a Visionary Digital BK plus with a Canon 40DSLR camera and processed with Photoshop CS6 (Adobe Inc.). The illustration of the 7th sternum was prepared following Attasopa & Warrit (2012). The specimens collected in Thailand were identified as *L. nitidiventris* by comparison with the holotype and using the original description of the species by Smith (1857). The word “hairs” without additional structural description refers to simple hairs; specialized hairs are noted as plumose hairs, robust hairs, etc. We use the word “setae” for small strong sclerotized portion on terminalia such as apical setae on S5 (as figs 2A2-C2 in Attasopa *et al.*, 2018). Terminology and measurements follow Michener (2007) with some terms and additional measurements as in Attasopa *et al.* (2018) and the term metapostnotum refers to what is often called the propodeal triangle. Flagellomere, and metasomal sternum and tergum represented by F, S, and T, respectively, with the number following the letter indicating which segment. The terminology for the surfaces of legs follows Aguiar & Gibson (2010).

TAXONOMY AND RESULTS

Order: Hymenoptera

Family: Apidae

Subfamily: Apinae

Tribe: Meliponini

Genus: *Lepidotrigona* Schwarz, 1939

***Lepidotrigona nitidiventris* (Smith, 1857)**

Figs 1-17

Holotype Worker (female): Figs 1-3

Type material examined: OUMNH; worker holotype; MALAYSIA; labelled as follows: “Holo-/ type”, “M. OPHIR/ 79”, “*Trigona nitidiventris* ./ Smith” “*Tr. nitidiventris*/ Smith J. Pr. L./ Soc. T. 2 p 50/ Malacca M. Ophir” (see inset to Fig. 3).

Diagnosis: *Lepidotrigona nitidiventris* is the type species of the genus and also the nominate species of the species group which comprises the largest species of the genus. Workers differ from those of *L. ventralis*

and the *L. terminata* groups by a combination of body size (more than 5.5 mm) and apically expanded metatibia (spoon-like: as wide as approximately half its length, more than 0.46 times). In the other two groups the body length is usually less than 5.5 mm, and the metatibial ratio less than 0.45 times. *Lepidotrigona nitidiventris* also differs in the faintly yellow-tinged wings which are pale brownish grey in the other two groups. *Lepidotrigona nitidiventris* has robust hairs on the anterior and posterior margins of the mesoscutum and mesoscutellum, whereas the hairs are not robust on those areas in the *L. ventralis* group. *Lepidotrigona nitidiventris* can be differentiated from *L. latipes* by their brown tegula and black T2-T6, whereas they are yellowish brown and reddish brown, respectively, in *L. latipes*. The pale yellowish-brown vertex hairs in *L. nitidiventris* separate it from *L. trochanterica*, where those hairs are all black. *L. palavanica* differs from *L. nitidiventris* in being much smaller in body size and metatibial ratio.

Re-description of the species:

Structure: Body length 6.62 mm. Head wider than long (width 2.57 mm, length 1.95 mm); eye width (in side view) 0.67 mm; gena width 0.32 mm; interocellar distance 0.44 mm; ocellocular distance 0.38 mm; inner orbits slightly converging below, upper interorbital distance 1.51 mm, lower interorbital distance 1.46 mm; scape length excluding basal bulb 0.99 mm, with basal bulb 1.09 mm; 1st flagellomere length 0.16 mm; 2nd flagellomere length 0.24 mm, width 0.17 mm; 3rd flagellomere shorter than 2nd; malar space length 0.13 mm; length of longest hair on vertex 0.2 mm. Length of longest hair on mesoscutum 0.16 mm; length of longest hair on mesoscutellum 0.11 mm; forewing length 5.84 mm, width 2.32 mm; forewing diagonal 1.89 mm, length of 1st submarginal cell 0.41 mm, length of 2nd submarginal cell 0.87 mm; 1st recurrent vein before mid-length of posterior margin of 2nd submarginal cell. Metatibia length 2.51 mm, width 1.27 mm; metabasitarsus length 0.95 mm, width 0.66 mm.

Coloration of integument: Head black except as follows: apex of mandible dark brown; basal bulb and extreme base of scape, and base of F1 yellow; rest of flagellum dark brown. Mesosoma black except tegula, pronotal lobe, and sides of metanotum all brown; all legs black except all trochanters, procoxa, metacoxa ventrally, profemur ventrally, and posterior portion of metabasitarsus brown, tarsomeres 3 to 5 yellowish brown; wings hyaline to pale yellow, wing veins yellowish brown except C, R, M, and Rs brown. Metasomal terga black except basal depression and posterior margin of T1 whitish brown; metasomal sterna yellowish brown.

Pubescence: Facial hairs mostly plumose, densely appressed and whitish yellow; hairs of lower edge of labrum and mandible pale brown, hairs of vertex robust and pale yellowish-brown, longest hairs on vertex

approximately 1/5 times as long as scape. Mesoscutum and mesoscutellum hairs minute yellowish white; hairs of anterior and posterior areas of mesoscutum and mesoscutellum robust, yellowish brown; mesoscutellum with some dark brown hairs intermixed, longest hairs on mesoscutum and mesoscutellum approximately 1/6th and 1/9th as long as scape, respectively; margins of mesoscutum and mesoscutellum with distinct band of short, plumose, scale-like yellow hairs, bands on mesoscutum wider anteriorly and posteriorly; mesepisternum, metepisternum, and pronotal lobe with whitish-yellow, plumose hairs, intermixed with long white hairs on mesepisternum ventrally; hairs on lateral surface of metanotum and propodeum plumose, yellowish white; metapostnotum bare; coxae and trochanters as well as ventral surface of profemur with yellowish-white hairs, rest of profemur with brown hairs intermixed with black hairs distally; tibiae with black hairs except metatibia with whitish-brown keirotichia posteriorly; protarsi with brown hairs except probasitarsus with black hairs intermixed; meso- and metatarsi with black hairs intermixed with few brown hairs. T1 with minute, sparse, pale whitish-brown hairs except basal depression and posterior margin lacking hairs. Posterior margin of T2-T6 as well as visible portions of T5 and T6 with minute pale brown hairs intermixed with dark brown hairs on posterior half of T5 and T6; S1-S6 minute with sparse yellowish-brown hairs.

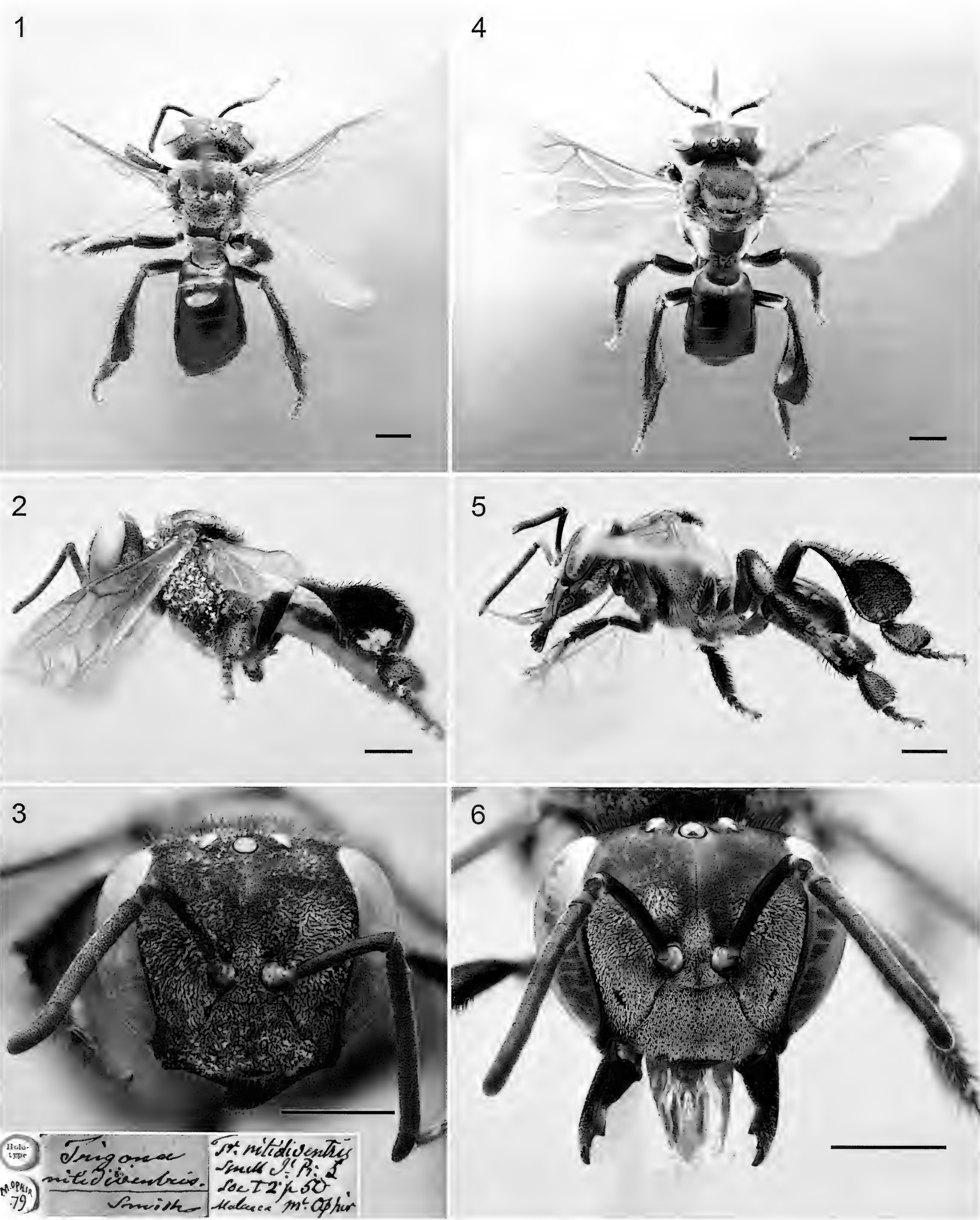
Surface sculpture: Head and mesosoma with fine, dense punctures, slightly larger on mesoscutellum; metapostnotum with larger crowded punctures all over, diameters 1.5-2 times those of head; all legs with sparse, shallow and fine punctures; lateral part of T1, posterolateral parts of T1-T4 and complete T5 and T6 with sparse shallow, fine punctures; posterior margin of T2-T4 and complete T5 and T6 with minute, shallow punctures; S1-S6 with fine shallow punctures all over.

Worker (female): Figs 4-6

Material examined: BCMU-LNW01; nest UP45; 2 workers; THAILAND, Tak Province., Umphang District; 5.V.2011; leg. prep. H. Bänziger. – All remaining specimens with the same labels except as follows: BCMU-LNW02; nest UP45; 2 workers; 19.VI.2012. – BCMU-LNW03; nest UP45; 2 workers; 21.III.2016. – BCMU-LNW04; nest UP88; 3 workers; 7.V.2016. – MHNG-LNW05; nest UP88; 1 worker; 7.V.2016.

Variation: N=10, measured as range (average \pm SD). As in holotype except as follows:

Structure: Body length 5.69-6.56 (6.17 \pm 0.22) mm. Head width 2.58-2.87 (2.77 \pm 0.08) mm; head length 1.84-2.03 (1.96 \pm 0.05) mm; eye width (in side view) 0.63-0.68 (0.66 \pm 0.01) mm; gena width 0.3-0.42 (0.37 \pm 0.04) mm; interocellar distance 0.42-0.48 (0.45 \pm 0.02) mm;



Figs 1-6. *Lepidotrigona nitidiventris*, worker. (1-3) The Malaysian holotype, including its label at the bottom left of (3). (4-6) Thai worker, BCMU-LNW04 (HB-W1). Dorsal habitus (1, 4), lateral habitus (2, 5), head, frontal view (3, 6). Scale bars: 1 mm.

ocellocular distance 0.38-0.42 (0.4 ± 0.01) mm; upper interorbital distance 1.51-1.61 (1.56 ± 0.03) mm, lower interorbital distance 1.46-1.56 (1.52 ± 0.03) mm; scape length excluding basal bulb 0.99-1.05 (1.03 ± 0.02) mm, with basal bulb 1.09-1.2 (1.17 ± 0.03) mm; 1st flagellomere length 0.16-0.18 (0.17 ± 0.01) mm; 2nd flagellomere length 0.2-0.23 (0.21 ± 0.01) mm, width 0.16-0.18 (0.17 ± 0.004) mm; malar space length 0.14-0.15 (0.14 ± 0.005) mm; length of longest hairs on vertex 0.2-0.25 (0.21 ± 0.02) mm. Length of longest hairs on mesoscutum 0.17-0.22 (0.19 ± 0.01) mm; length of longest hairs on mesoscutellum 0.13-0.18 (0.15 ± 0.02) mm; forewing length 5.73-6.27 (6.05 ± 0.18) mm, width 2.35-2.52 (2.21 ± 0.74) mm; forewing diagonal 1.94-2.03 (1.98 ± 0.03) mm, length of 1st submarginal cell 0.44-0.48 (0.46 ± 0.01) mm, length of 2nd submarginal cell 0.84-0.95 (0.89 ± 0.03) mm. Metatibia length 2.51-2.67 (2.6 ± 0.05) mm, width 1.23-1.32 (1.27 ± 0.02) mm; metabasitarsus length 0.95-1.07 (1 ± 0.04) mm, width 0.67-0.75 (0.7 ± 0.02) mm.

Coloration of integument: Tegula, wing veins M, Rs, and stigma slightly paler yellow than those of the holotype; mesoscutellum dark brown, sometimes with a brown spot posteromedially; tarsomeres 3 to 5 sometimes dark brown. T1 laterally with two large black triangular spots which occasionally are in contact with each other, rest of T1 sometimes light brown; metasomal sterna vary in darkness of brown.

Pubescence: Hairs of vertex slightly darker than those of the holotype, sometimes intermixed with dark brown hairs. Metasomal sternal hairs sometimes paler than those of the holotype.

Surface sculpture: Punctures on metasomal terga vary in density, otherwise as in holotype.

Male: Figs 7-17

Material examined: BCMU-LNM01; nest UP88; 7 males; THAILAND, Tak Prov., Umphang Distr; 7.V.2016; leg. prep. H. Bänziger; caught leaving the nest [not swarming]. – MHNG-LNM02; nest UP88; 1 male; Tak Prov., Umphang Distr; 7.V.2016; leg. prep. H. Bänziger; caught leaving the nest [not swarming].

Male terminalia and associated sterna: Dissected from five males (BCMU-LNM01) with the following codes: GP3200, GP3201, GP3205, GP3365, GPKA88.

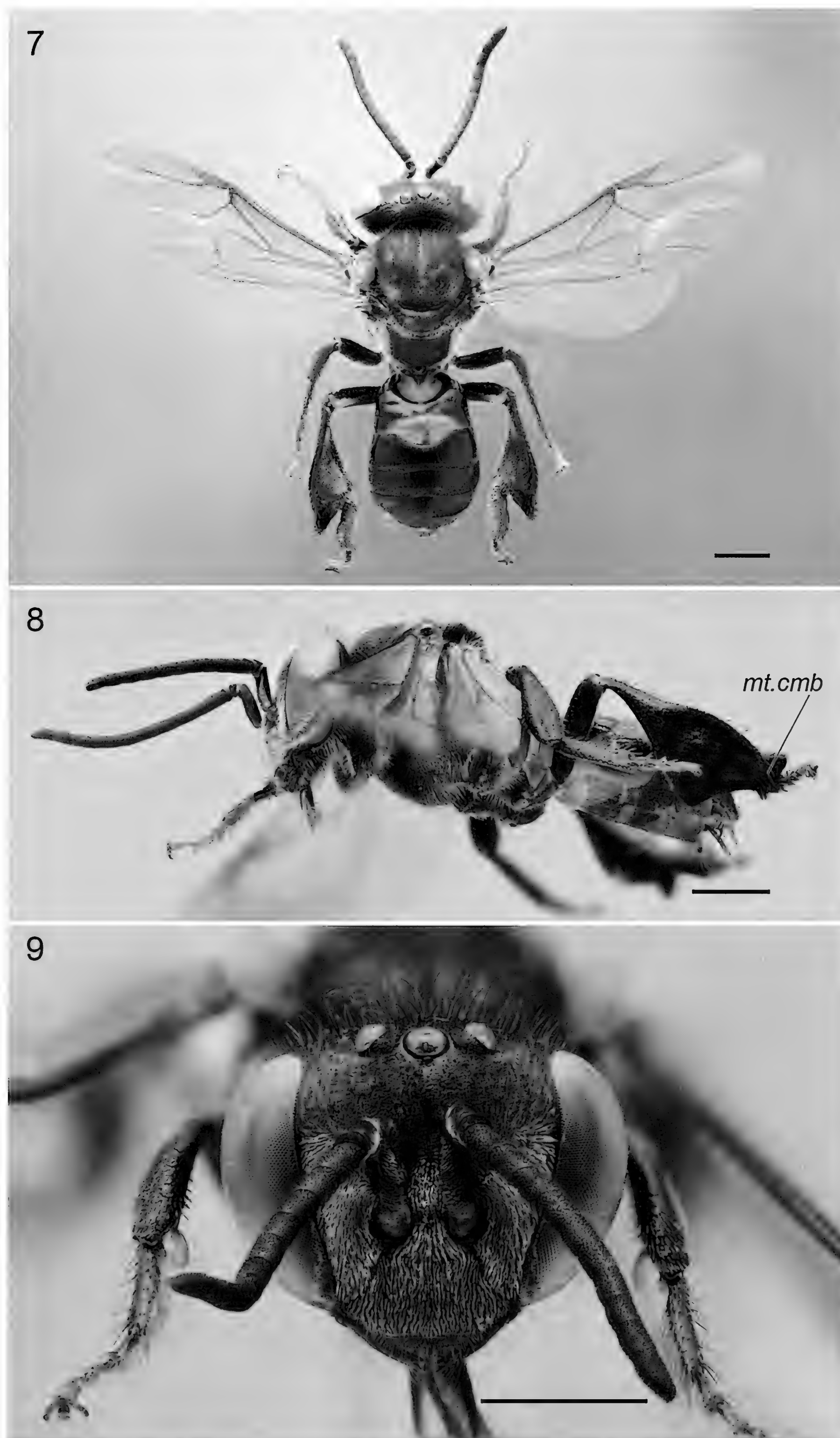
Diagnosis: Males differ from the males of *L. terminata* and *L. ventralis* group by their overall larger size, shape of the metatibia and of S5 and S6 as follows: male of *L. nitidiventris* with expanded, triangular metatibia with apical margin straight, with a black comb near apicodorsal area (missing in other species where males are known); metatibial hairs dark brown to black (Figs 7, 8). Metatibia of other species simple, rounded apically, without comb, with hairs grey to brown or intermixed with few dark brown hairs. S5

of *L. nitidiventris* has long protruding apical-lateral lobes, but no subapical lobes (Fig. 11), whereas S5 of other known males of the genus have short to very short lateral lobes, two distinct subapical lobes, and strong apical setae. S6 of *L. nitidiventris* with two deep subapical emarginations with long, narrow apical-medial lobes (Fig. 12), S6 of other known males of the genus do not have or have only weakly produced subapical emarginations, and short apical-medial lobes. Genital capsule of *L. nitidiventris* bilaterally symmetrical (Fig. 16), asymmetrical in the known species that belong to the *L. ventralis* group.

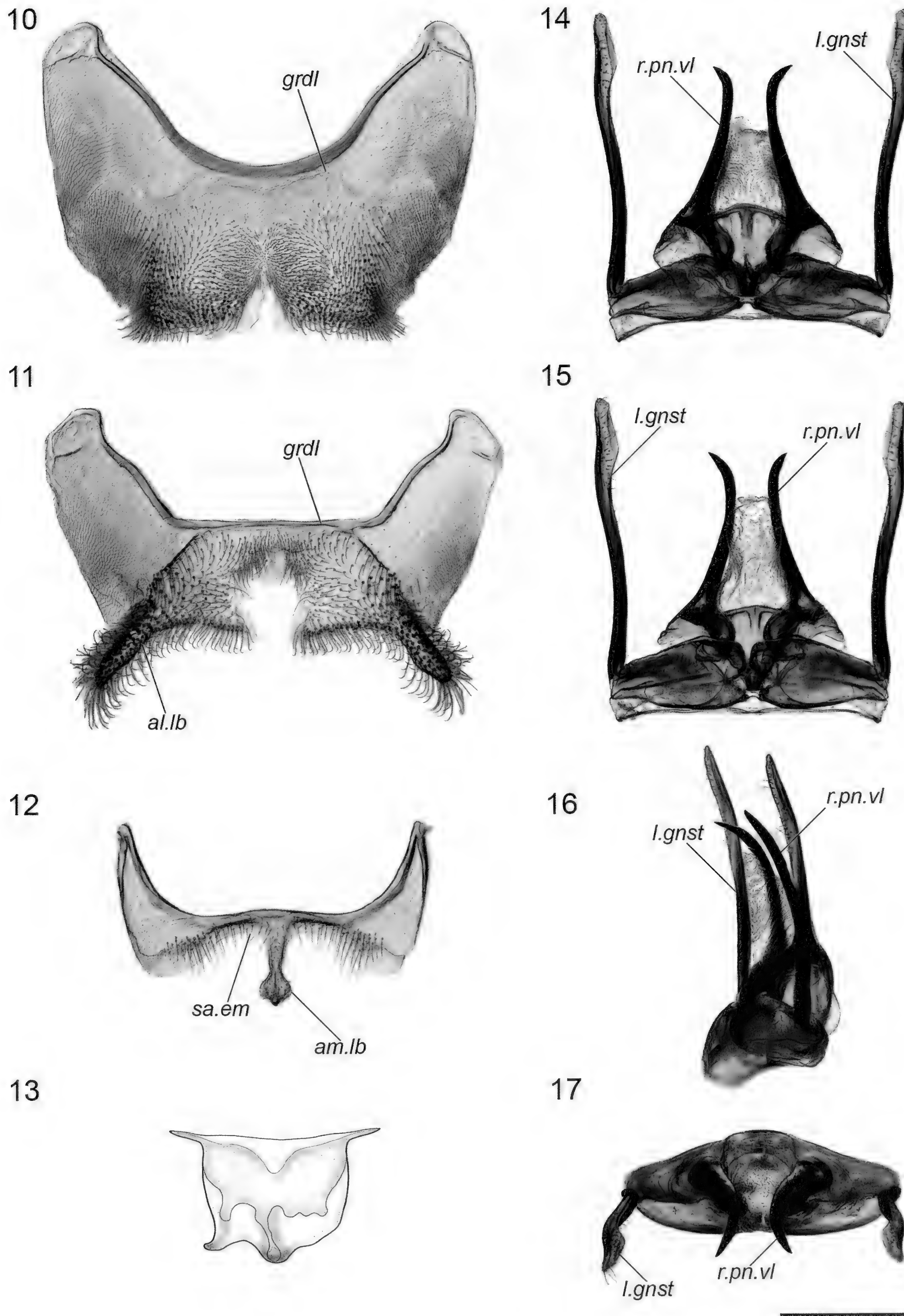
Description: N=8, measured as range (average \pm SD). As in the worker holotype except as follows:

Structure: Body length 6.19-6.98 (6.56 ± 0.3) mm. Head width 2.4-2.62 (2.55 ± 0.07) mm; head length 1.81-2 (1.89 ± 0.06) mm; eye width (in side view) 0.62-0.72 (0.68 ± 0.04) mm; gena width 0.28-0.37 (0.31 ± 0.03) mm; interocellar distance 0.4-0.55 (0.49 ± 0.05) mm; ocellocular distance 0.3-0.33 (0.33 ± 0.01) mm; inner orbits converging below, upper interorbital distance 1.49-1.56 (1.52 ± 0.02) mm, lower interorbital distance 1.04-1.11 (1.07 ± 0.02) mm; scape length excluding basal bulb 0.75-0.78 (0.78 ± 0.01) mm, with basal bulb 0.88-0.95 (0.93 ± 0.02) mm; 1st flagellomere length 0.14-0.16 (0.15 ± 0.01) mm; 2nd flagellomere length 0.28-0.3 (0.3 ± 0.01) mm, width 0.16-0.17 (0.16 ± 0.004) mm; malar space length 0.02-0.03 (0.03 ± 0.003) mm; length of longest hairs on vertex 0.33-0.43 (0.37 ± 0.04) mm. Length of longest hairs on mesoscutum 0.2-0.24 (0.22 ± 0.01) mm; length of longest hairs on mesoscutellum 0.16-0.18 (0.17 ± 0.01) mm; forewing length 5.6-6.05 (5.86 ± 0.14) mm, width 2.05-2.18 (2.12 ± 0.04) mm; forewing diagonal 1.78-1.97 (1.86 ± 0.06) mm, length of 1st submarginal cell 0.43-0.48 (0.45 ± 0.02) mm, 2nd submarginal cell length 0.77-0.83 (0.8 ± 0.02) mm. Metatibia length 2.48-2.66 (2.57 ± 0.07) mm, width 1.08-1.2 (1.16 ± 0.03) mm; metabasitarsus length 0.7-0.77 (0.73 ± 0.02) mm, width 0.48-0.53 (0.51 ± 0.02) mm. Apex of S1 and S2 entire, S3 with small narrow emargination apicomediaally; apical margin of metatibia flat diagonally (not rounded) forming a triangular-shaped metatibia, and with a black metatibial comb on the apex near the dorsal margin.

Coloration of integument: Yellowish-brown area on F1 slightly darker than in holotype. Mesosoma black except tegula and pronotal lobe light brown, mesoscutellum seldom with yellowish-brown spot posteromedially; procoxa and proximoventral area of profemur brown, protrochanter and protarsus yellowish brown, rest of fore leg black; mid and hind legs black except mesotrochanter, and meso- and metatarsomeres 4-5 yellowish-brown, metatrochanter and ventral area of meso- and metafemurs brown, anterodistal and posterior area of metatibia and metabasitarsus sometimes brown, hyaline wings pale yellowish, slightly more brownish tinged than in workers,



Figs 7-9. *Lepidotrigona nitidiventris*, male, BCMU-LNM01 (HB-M1). Dorsal habitus (7), lateral habitus (8), head, frontal view (9). *mt.cmb* – metatibial comb. Scale bars: 1 mm.



Figs 10-17. *Lepidotrigona nitidiventris*, male terminalia and associated sterna, BCMU-LNM01 (HB-M1), GPKA88. (10-13) S4-S7, ventral view. (14-17) Genital capsule. Dorsal aspect (14), ventral aspect (15), lateral aspect (16), caudal aspect (17). *al.lb* – apicolateral lobe, *am.lb* – apicomedian lobe, *grdI* – gradulus, *l.gnst* – left gonostylus, *r.pn.vl* – right penis valve, *sa.em* – subapical emargination. All figures are shown at the same scale. Scale bar: 0.5 mm.

wing veins yellowish brown except C and R, dark brown. Metasomal terga black except basal depression of T1 brownish white or vary to light brown, T6 and T7 sometimes dark brown; S1-S7 light brown.

Pubescence: Hairs of vertex long whitish brown, longest hairs approximately half of scape length; scape with thin white hairs medioventrally. Hairs of mesoscutum and mesoscutellum mostly whitish brown with brown hairs intermixed on mesoscutellum posteriorly, the longest hairs on mesoscutum and mesoscutellum approximately 3/10 and 2/9 as long as scape, respectively; posterolateral margin of mesoscutum with thinly scattered whitish-yellow plumose hairs, which vary in density, sometimes to the point that the plumose hairs are missing altogether laterally; pronotal lobe, mesepisternum, metepisternum, lateral surface of propodeum, and metanotum with short, plumose, yellowish-white hairs intermixed with yellowish-white simple hairs, the simple hairs longest on mesepisternum ventrally; coxae and trochanters with long white hairs; femurs with white hairs ventrally and with short dark brown hair dorsodistally; protarsi with light brown hairs intermixed with few dark brown hairs; pro-, mesotibiae, and metatarsus with dark brown hairs intermixed with few whitish-brown hairs; metatibia with black or sometimes dark brown hairs, and with a black comb restricted to the apical angle, as well as with yellowish-white keirotichia posteriorly. Metasomal tergal hairs as those of the holotype except lateral and posterior area of T4-T5, T6 and T7 posteriorly with black hairs; S1-S3 with short brown hairs.

Surface sculpture: As for the holotype but punctures smaller and denser on mesoscutum.

Terminalia and associated sterna: S4 emarginate apicomediaally forming an apex with two broad shallow lobes, S4 gradulus almost touching anterior margin of sternum anteromedially; area posterior to gradulus with short hairs, the hairs denser on lateral lobes, and with a brown spot laterally (Fig. 10). S5 with long protruding apicolateral lobe posterolaterally oriented, and with deep emargination apicomediaally, gradulus transverse medially, touching anterior margin of sternum; S5 with hairs on posterior area from gradulus, longer on posterior margin and apicolateral lobe; S5 brown marked laterally, darker on the apicolateral lobe (Fig. 11). S6 biconcave with long apicomediaal lobe, narrowing distally with spatulate apex, apical emarginations with long hairs (Fig. 12). S7 convex apicomediaally and bisinuate apicolaterally, with small asymmetrical subapicolateral lobes, the left lobe appearing to be slightly more protruding than the right one (Fig. 13). Gonostylus longer than penis valve, tip expanded widest at approximately apical 1/6, genital capsule and apical 1/3 of gonostylus light brown except penis valve and the remainder of gonostylus black. Penis valve narrow, first weakly curved ventrally mainly at mid-length, slightly curved lateroventrally towards apex (Figs 14-17).

Additional type material examined:

Lepidotrigona latipes (Friese, 1900)

Type material examined: ZMB; worker holotype; MALAYSIA [Malacca, not Singapore, see discussion]; labelled as follows: “India/ Singapore/ 1890”, “Trigona/ latipes/F. /1909 Friese det.”, “Type”, “Coll Friese”, “HOLOTYPE/ Trigona/ latipes Friese/ Examined C Rasmussen ’07”.

Lepidotrigona palavanica (Cockerell, 1915)

Type material examined: NHMUK 013379686; worker holotype; PHILIPPINES; labelled as follows: “Type”, “Trigona/ palavanica/ CKll. TYPE.”, “B.M. TYPE HYM. 17B.1120”, “3839”, “P. Princess/ Palawan/ Baker”, “Brit: Mus 1933-567.”.

Lepidotrigona trochanterica (Cockerell, 1920)

Type material examined: NHMUK 013379685; worker holotype; MALAYSIA, labelled as follows: “Type”, “B.M. TYPE HYM. 17B.1102”, “Trigona/ trochanterica/ CKll. TYPE.”, “Sadakan/ Borneo/ Baket”, “Brit Mus./ 1933-567.”.

DISCUSSION

Our finding that the holotype worker of *L. nitidiventris* matched the workers from the two nests from western Thailand came as a surprise because of the geographic distance between the type locality and the new sites. In our previous study (Attasopa *et al.*, 2018), we found that each of the small *Lepidotrigona* species are present only within a radius of some 300-500 km, whereas the distance between the Malaysian type locality and the Thai sites of *L. nitidiventris* is about 1500 km. Admittedly, *L. nitidiventris* is much larger, nearly twice the forewing length, and it is well-known that flying distance in meliponines is correlated partially with forewing length (e.g. Araújo *et al.*, 2004), as it is in general with bees as a whole (Greenleaf *et al.*, 2007). However, Bänziger (2018) found that in lachryphagous meliponines, e.g. the minute *Lisotrigona furva* Engel, the flying distance is four or more times that of *Tetragonula iridipennis* (Smith) although this species is larger – possibly an adaptation to a mobile and ephemeral source in tear drinkers. So there can be exceptions to the rule. Rathor *et al.* (2013) and Rasmussen (2013) found *Tetragonula gressitti* (Sakagami) in Northeast India, a distance of more than 2000 km from the type locality in southern Vietnam (Dalat). Unfortunately, due to the rarity of both species, no DNA analyses have yet been possible for corroboration of the conspecificity of the geographically distant samples of *L. nitidiventris* or *T. gressitti*. Nevertheless, there are DNA-based studies which show that South American *Scaptotrigona xanthotricha* Moure

has only weak molecular isolation over a distance of nearly 2000 km (Duarte *et al.*, 2014). With a body length of 6-7 mm this species is comparable in size to *L. nitidiventris*.

Males of *L. nitidiventris* can be compared to the males of the other two *Lepidotrigona* groups: the mid-sized *L. terminata* (sensu Schwarz, 1939: fig. 15) and the small-sized *L. satun* Attasopa & Bänziger, 2018, *L. doipaensis* (Schwarz, 1939), and *L. flavibasis* (Cockerell, 1929) (Attasopa *et al.*, 2018: figs 5A, 7B, 8B) the metatibia lacks a comb near the apicodorsal area. In *L. nitidiventris* the metatibia is unique in having an apical comb and in being triangular in-shape (Figs 7, 8). In contrast, the males of the other two species groups lack the comb and have a narrower shaped metatibia. Another good character to separate *L. nitidiventris* from all the other known males of the genus is S5: in *L. nitidiventris* it lacks the subapical lobes but has long apicolateral lobes (Fig. 11), whereas all other known males have subapical lobes with apical setae but only short lateral lobes [Schwarz, 1939: fig. 16B; Attasopa *et al.*, 2018: fig. 2 (A2, B2, C2)].

Concerning the other three species of the *L. nitidiventris* group, we make the following comments. When Schwarz (1939) treated *L. palavanica* he was not sure whether it was a variety of *L. nitidiventris* because he had not studied the type of the former species. He knew the species only from Cockerell's (1915) description. However, according to our examination of the *L. palavanica* type, this taxon is much smaller than any species of the *L. nitidiventris* group and the metatibial ratio is only 0.45, clearly smaller than the ratio found in species of the *L. nitidiventris* group. Therefore, *L. palavanica* should not be considered as a member of the *L. nitidiventris* group as it is closer in size and metatibial shape to species of the *L. terminata* group, to which it might belong. Phylogenetic analyses are required to determine the make-up of subgroups within the genus and it would seem that discovery of the males of more species will be valuable in providing useful characters.

Our examination of the holotypes of *L. latipes* and *L. trochanterica* reveals them to be large bees (body length more than 5.5 mm) with a high metatibial ratio (more than 0.46). Consequently, they belong to the *L. nitidiventris* group. Our examination of their holotypes indicates that *L. latipes* and *L. trochanterica* clearly differ from each other as well as from *L. nitidiventris* as stated in the diagnosis of the latter species.

The type locality of *L. latipes* poses a problem. The label of the holotype, viz. "India/ Singapore/ 1890", does not make much sense. Friese's (1900) description of the species was in Latin. For the type locality he wrote (in German): "1 ♂ von *Malacca* (Singapore)" [Friese's italics; also, "von" meaning "from"]. This is problematic because Singapore, both a town and an island, is 200 km southeast of Malacca. We interpret Singapore (written by Friese in parentheses) as the broader geographic-political designation of the locality in Friese's time, not the actual

collecting site. In those times, Malacca was part of the so-called Straits Settlements, a British Crown Colony from 1867 to 1947. They consisted of Penang, Malacca, Dinding, and Singapore. Singapore was the Seat of Government of the Straits Settlements. We understand that Friese used Singapore as the broader, better-known regional name for the Settlements, as we would now use Malaysia for Malacca. Consequently we consider that the type locality of *L. latipes* is Malacca (in peninsular Malaysia), not Singapore.

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**A revision of the Chilean Brachyglutini – Part 6. Revision of *Achilia* Reitter, 1890:
A. grandiceps, *A. valdiviensis*, and *A. bicornis* species groups
(Coleoptera: Staphylinidae: Pselaphinae)**

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Abstract: The *Achilia grandiceps*, *A. valdiviensis*, and *A. bicornis* species groups *sensu* Jeannel (1962) of the species-rich genus *Achilia* Reitter, 1890 are revised. Of the eighth taxa placed in these three groups of species, two subspecies, i.e. *A. grandiceps grandiceps* Jeannel, 1962 and *A. grandiceps delamarei* Jeannel, 1962 are raised to species level – *A. grandiceps* Jeannel, 1962 **stat. nov.** and *A. delamarei* Jeannel, 1962 **stat. nov.** – while three names are placed in synonymy – *A. alticola* Jeannel, 1962 = *A. grandiceps* Jeannel, 1962 **syn. nov.**, *A. kuscheli* Jeannel, 1962 = *A. valdiviensis* (Blanchard, 1851) **syn. nov.**, and *A. chilotides* Newton, 2017 = *A. excisa* (Schaufuss, 1880) **syn. nov.** – The remaining five species are redescribed, and the new species *A. franzi* **n. sp.**, *A. jeanneli* **n. sp.**, and *A. elguetai* **n. sp.**, attributed to the *A. grandiceps* group, are described. A new synonymy *A. simpsoni* Franz, 1996 = *A. bicornis* Jeannel, 1962 **syn. nov.** is also established, and the lectotypes of *A. delamarei* Jeannel, 1962 and *A. valdiviensis* (Blanchard, 1851) are designated. For all these species their distribution is detailed and mapped, and habitat/collecting data are summarized.

Keywords: *Achilia* - Chile - taxonomy - new species - distribution.

INTRODUCTION

This article is the sixth contribution to our series aiming at a taxonomic revision of the Brachyglutini of the temperate region of southern South America, and the fifth dedicated to the genus *Achilia* Reitter, 1890 (Kurbatov & Sabella, 2015; Sabella *et al.*, 2017; Kurbatov *et al.*, 2018, Sabella *et al.*, 2019; Kurbatov *et al.*, 2019).

We here focus on the *A. grandiceps*, *A. valdiviensis*, and *A. bicornis* species groups (*sensu* Jeannel, 1962). All the members of these groups are critically reexamined, and their synonymic framework is detailed. These species are redescribed, and three new species placed in the *A. grandiceps* group are described.

Regarding the prevalence of the spelling of the genus *Achilia* vs *Achillia* see Sabella *et al.* (2017: 120). The species groups of *Achilia* as defined by Jeannel (1962), which are mainly based on male sexual dimorphism, as well as their possible phylogenetic relationships will be reassessed later. A key to identification of the species of *Achilia* will be provided only at the end of this series of contributions.

MATERIAL AND METHODS

This study is based on the examination of 2495 specimens. The acronyms used in the present study refer to the following collections (relevant curator/collection manager are acknowledged in parentheses):

DBUC	Department of Biological, Geological and Environmental Sciences, University of Catania, Italy
FMNH	Field Museum of Natural History, Chicago, U.S.A. (J. Boone)
JEBC	Colección Entomológica Y Museo Juan Enrique Barriga – Tuñón, Curicó, Chile (J. E. Barriga – Tuñón)
MHNG	Muséum d'Histoire Naturelle, Genève, Switzerland
MNHN	Muséum National d'Histoire Naturelle, Paris, France (T. Deuve and A. Taghavian)
MNHS	Museo Nacional de Historia Natural, Santiago, Chile (M. Elgueta Donoso and Y. J. Sepulveda Guaico)

MSNG	Museo Civico di Storia Naturale “G. Doria”, Genova, Italy (R. Poggi)
NHMW	Naturhistorische Museum, Wien, Austria (H. Schillhammer)
PCTS	Private collection of Tim Struyve, Mechelen, Belgium (T. Struyve)
PCVB	Private collection of Volker Brachat, Geretsried, Germany (V. Brachat)
PHPC	Private collection of Peter Hlavác, Prague, Czech Republic (P. Hlavác)
UNHC	University of New Hampshire Arthropod Collection, Durham, NH, U.S.A. (D.S. Chandler)

Under the sections “type material” or “additional material” the locality data are standardized, with indications of major administrative units (regions and provinces) and names of collectors; for the holotypes of older specimens the labels are also given verbatim. For MHNG materials additional informations pertaining to sampling sites are enriched from unpublished locality lists when available. For the method of selection of the type material see Sabella *et al.* (2017).

The aedeagi and other body parts illustrated here were mounted in Canada balsam on acetate slides, and drawn using a drawing tube mounted on a Zeiss Axioskop compound microscope. Images were taken using a Leica DFC425 camera in conjunction with a Leica M205-C compound microscope. Zerene Stacker (version 1.04) was used for image stacking. All images were modified and grouped using Adobe Photoshop and Illustrator CS6. The body length is measured from the anterior clypeal margin to the posterior margin of the last visible abdominal tergite. The length and width of the body parts were measured between points of maximum extension, e.g. the head length is measured between the anterior clypeal margin and the posterior margin of the neck, the head width includes the eyes, the elytral length along the suture line, and the elytral width is the total width of the two elytra taken together. The abdominal tergites are numbered based on order of visibility. Morphological terminology follows that of Chandler (2001), except our use of ‘ventrite’ instead of ‘sternite’ when describing meso- and metathoracic structures, and that the sclerotized features of the aedeagus termed “dorsal strips” in Sabella *et al.* (2017) are here termed “longitudinal struts”.

TAXONOMY

All the species described below show the following common features: pubescence decumbent, consisting of long setae sparse and uniform over entire body; surface of pronotal disc smooth and shiny with some punctures; basal margin of pronotum bordered with row of contiguous shallow impressions; elytra together wider than long with protruding humeri; elytral disc smooth,

shiny, with punctures, and with four basal foveae (two lateral foveae very close and sometimes coalesced to form one very large fovea), sutural stria entire; abdomen smooth, with some minute punctures; first abdominal tergite with short and sparse setal brush between basal striae; first abdominal sternite with medial carina starting at its anterior margin and extended on about one third of its length; legs with trochanters elongate; profemora and mesofemora of male slightly thickened.

In order to keep the text more concise, these features are not repeated in their respective descriptions.

Achilia grandiceps species group

Jeannel (1962: 398, 419) characterized this group as follows: elytra with 3 basal foveae (note that as mentioned above in reality there are four basal foveae with two lateral foveae very close and sometimes coalesced); basal striae of first abdominal tergite separated about by one third of tergal width; very large male’s frons with two large occipital lobes separated by large and deep median notch; distal end of longitudinal struts of aedeagus spatulate.

Among the species groups we have revised so far this is certainly the most complex regarding recognition of the distinct species. Difficulties come notably from the very similar structure of the aedeagus of most of the species, in combination with the variability of several characters usually quite stable in the other congeners, such as the proportions of antennomeres, some male secondary sexual character on trochanters and tibiae, etc. Due to the very poorly discriminant aedeagi, we considered it appropriate to define species mainly based on characters of the external morphology, such as the shape of head, antennae and legs, which often show clear and stable differences even between sympatric taxa. Moreover, in most cases we could identify even the females of the species as defined below.

The strong similarities of the aedeagal morphology (with the exception of *A. denticornis*), as well as that of the mesotrochanters (with the exception of *A. denticornis*) and mesofemora, the relative stability of some characters (i. e. morphology of the head and the antennae in both sexes, and of some characters of the protibiae and mesotibiae), the variability of others (i. e. protrochanters, and pubescence of mesotibiae), and also the fact that in many cases two or three of these taxa were caught in the same samples without observation of any specimens showing intermediate character states, suggest that speciation in this group is currently active at different levels of completion, hence the difficulties we faced in the taxonomic treatment of this group.

Until now this group included *A. grandiceps grandiceps* Jeannel, 1962, *A. grandiceps delamarei* Jeannel, 1962, *A. alticola* Jeannel, 1962 and *A. denticornis* Jeannel, 1962. However, after examination of the types we

concluded that: 1) *A. grandiceps grandiceps* Jeannel, 1962 and *A. grandiceps delamarei* Jeannel, 1962, should be considered as two distinct species and treated accordingly – i. e. *A. grandiceps* Jeannel, 1962 (**stat. nov.**), and *A. delamarei* Jeannel, 1962 (**stat. nov.**) – and that 2) *A. alticola* Jeannel, 1962 is a junior subjective synonym of *A. grandiceps* Jeannel, 1962 (**syn. nov.**). As a result, the *A. grandiceps* group now consists in *A. grandiceps* Jeannel, 1962, *A. delamarei* Jeannel, 1962 and *A. denticornis* Jeannel, 1962, to which we add here three new species – i. e. *A. jeanneli* n. sp., *A. franzi* n. sp. and *A. elguetai* n. sp. – described below.

All the species of the *A. grandiceps* group show the following common features: head distinctly wider than long with two vertexal foveae spaced by approximately one eye's diameter from eyes, the latter protruding and about as long as slightly convex temples. Pronotum wider than long, with convex disc; median antebasal fovea slightly smaller than lateral ones (only in many specimens of *A. grandiceps* it is as large as lateral ones). Anterior portion of lateral margins of pronotum distinctly convergent and sinuate anteriorly. Elytral discal stria extended at most to elytral midlength. Head of male with clypeus slightly elongate and with slightly convergent sides, its anterior margin slightly prominent and rounded. All abdominal ventrites of male unmodified. Female with vertexal foveae larger than for male, antennae thinner and with shorter antennomere XI than for male; metaventrite and legs unmodified.

In order to keep the text more concise, these features are not repeated in their respective descriptions.

***Achilia grandiceps* Jeannel, 1962 (stat. nov.)**

Figs 1, 12, 22, 29, 40-41, 51-54, 83

Achilia grandiceps grandiceps Jeannel, 1962: 421, figs 181 (habitus), 182 (aedeagus).

Achilia grandiceps Kurbatov & Sabella, 2015: 304, fig. 62 (habitus).

Achilia alticola Jeannel, 1962: 421, 423, fig. 185 (aedeagus) (**syn. nov.**).

Type material (10 ex.): SOUTHERN CHILI: Región Los Lagos: Chiloé prov.: MHNS; 1 ♂ (holotype of *A. grandiceps grandiceps*); labels verbatim “Type / Chepu, 17.X.1958, G. Kuschel / *Achillia grandiceps* / *grandiceps* (handwritten by Jeannel) / CHILE, M.N.H.N., Typo, n. 1839”. – MNHN; 1 ♀ (paratype of *A. grandiceps grandiceps*); same data. – MNHN; 1 ♀ (paratype of *A. grandiceps grandiceps*); same data, but 01.X.1958. – MNHN; 1 ♂ (paratype of *A. grandiceps grandiceps*); same data, but 02.X.1958 – MNHN; 1 ♀ (paratype of *A. grandiceps grandiceps*); labels verbatim “Chepu, 09.X.1958, Kuschel”. – MNHN; 3 ♀ (paratypes of *A. grandiceps grandiceps*); same data, but 11.X.1958. – MNHN; 1 ♀ (paratype of *A. grandiceps grandiceps*); same data, but 16.X.1958. – MHNS; 1 ♂

(holotype of *A. alticola*); labels verbatim “Type / San Pedro, 10.XI.1958, G. Kuschel / *Achillia alticola* / *alticola* (handwritten by Jeannel) / CHILE, M.N.H.N., Typo, n. 1842”.

Additional material examined (443 ex.): SOUTHERN AND CENTRAL CHILI: Región Los Lagos: Chiloé prov.: NHMW; 1 ♂ and 1 ♀ (the latter identified by Franz as *A. bicornis*); Chiloé; H. Franz. – MHNG; 1 ♂; same data. – MHNS; 1 ♀ (mislabelled as paratype of *A. grandiceps* n. 2043); Chepu; 17.X.1958; G. Kuschel. – MHNS; 2 ♀ (mislabelled as paratypes of *A. grandiceps* n. 2044-45); same data, but 11.X.1958. – FMNH (FMHD #2002-77); 1 ♂ and 9 ♀; road to Miraflores, ca 0.6 km W Ruta 5; 42° 46.74'S 73° 47.70'W; 130 m; 12.XII.2002; site 1063, secondary valdivian rainforest with few conifers, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #2002-78); 1 ♀; road to Colonia Yungay, ca 4 km NW Ruta 5; 42° 59.12'S 73° 42.02'W; 110-115 m; 13. XII.2002; site 1064, disturbed valdivian rainforest w/ recent selective cutting, berlese, leaf & log litter; A. Solodovnikov & M. Thayer. – FMNH (FMHD #2002-068); 3 ♂ and 3 ♀; Quemchi, 11 km W of (11 km E Hwy 5); 42° 10.40'S 73° 35.73'W; 140 m; 10. XII.2002; site 1060, valdivian rainforest remnant w/ thick bamboo understory, berlese, leaf & log litter; A. Solodovnikov & A. Newton. – MHNG; 2 ♀; Chiloé National Park, Rancho Grande, near Cucao; 300-600 m; 04.I.1991; site 30a, *Fitzroya* forest; D. Agosti & D. Burckhardt. – MHNG; 1 ♀; Chiloé National Park, Rancho Grande, near Cucao; 42° 33'S 74° 02'W; 250-400 m; 29.XII.1992; site 35b, sifting of moss on forest floor trees and vegetational debris; D. Burckhardt. – Llanquihue prov.: MHNS; 3 ♂ and 1 ♀ (mislabelled as paratypes of *A. grandiceps* n. 2046-47 and 1840-41); Los Riscos; 11.IV.1954; G. Kuschel. – MNHN; 7 ♂ and 2 ♀; same data. – MHNG; 1 ♂ and 2 ♀; Alerce Andino National Park, above Laguna Chaiquenes; 41° 40'S 72° 35'W; 350-650 m; 04.I.1993; site 37, mixed *Fitzroya cupressoides* forest with thick moss cover inside, sifting of moss on floor and tree trunks and vegetational debris, hardwoods, berlese, litter; D. Burckhardt. – MHNG; 1 ♂; Alerce Andino National Park, Laguna Triángulo; 41° 40'S 72° 35'W; 550 m; 05-06.I.1993; site 38b, sclerophyll rainforest, sifting of moss on tree trunks and of vegetational debris; D. Burckhardt. – MHNG; 1 ♂; road to Alerce Andino National Park, 40° 20'S 73° 43'W; 07.XII.2013; car net. – FMNH (FMHD #97-28); 25 ♂ and 31 ♀; Alerce Andino National Park, near Sargazo entrance, 11.4 km from Correntoso; 41° 30'S 72° 37'W; 350 m; 19.I.1997; site 998, valdivian rainforest, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-30); 3 ♂ and 9 ♀; Alerce Andino National Park, N side Laguna Sargazo; 41° 30'S 72° 36'W; 400 m; 21.I.1997; site 1000, *Fitzroya cupressoides* w/valdivian rainforest, understory steep

slope, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-26); 5 ♀; Lago Chapo, 1.2 km N of NW end; 41° 25'S 72° 35'W; 265 m; 19.I.1997; site 996, small secondary *Nothofagus dombeyi* w/valdivian rainforest understory, berlese, leaf & log litter; A. Newton & M. Thayer. – MHNG; 5 ♂ and 6 ♀; Lenca, 41°58'S 72° 57'W; 18.XII.2013; layer litter. – PCTS; 14 ♂ and 7 ♀; same data. – FMNH (FMHD #97-11); 3 ♂; Vicente Perez Rosales National Park, SW slope Vn Osorno, km 10.1 to La Burbuja; 41° 08.30'S 72° 32.15'W; 925 m; 03-27.I.1997; site 988, *Nothofagus dombeyi* & *Podocarpus nubigena* w/valdivian rainforest understory, flight intercept trap; A. Newton & M. Thayer. – Osorno prov.: NHMW; 4 ♂ (1 identified by Franz as *A. spinifer*) and 4 ♀ (1 identified by Franz as *A. denticornis*); Puyehue National Park, Osorno; H. Franz. – FMNH; 2 ♂ and 1 ♀; Puyehue National Park, Antillanca road; 470 m; 20-25.XII.1982; valdivian rainforest, leaf & log litter, berlese, vouchers associated with larvae; A. Newton & M. Thayer. – UNHC; 1 ♂; Puyehue National Park, Antillanca road; 720 m; 18-24.XII.1982; site 659, *Nothofagus* ssp. forest, forest floor, leaf & log litter, berlese; A. Newton & M. Thayer. – UNHC; 7 ♂ and 13 ♀; Puyehue National Park, Antillanca road; 690 m; 18-24.XII.1982; site 661, valdivian rainforest, window trap; A. Newton & M. Thayer. – UNHC; 1 ♂; Puyehue National Park, Antillanca road; 470-720 m; 18-24.XII.1982; valdivian rainforest, pyrethrin fogging moss; A. Newton & M. Thayer. – MHNG; 2 ♂; Puyehue National Park, Antillanca road; 500-1000 m; 18-20.XII.1984; car netting; S. & J. Peck. – MHNG; 2 ♂ and 10 ♀; Puyehue National Park, Aguas Calientes, 400-500 m; 31.XII.1990/1.I.1991; site 25a, sifting of vegetational and alluvial debris, and moss; D. Agosti & D. Burckhardt. – MHNG; 5 ♂; Puyehue National Park, Aguas Calientes; 500 m; 20.XII.1984-08.II.1985; FIT derumbes forest trail, sifting; S. & J. Peck. – FMNH (FMHD #85-928, #85-43); 1 ♀; same locality, but 20.XII.1984; forest litter on trail, sifting; S. & J. Peck. – PCTS; 8 ♂; Aguas Calientes, 40° 74'S 72° 27'W; 13.XII.2013; car net. – PCTS; 3 ♂ and 8 ♀; same data, but 14.XII.2013; litter layer. – FMNH (FMHD #96-244); 14 ♂; Puyehue National Park, Antillanca road, 7.2 km above Aguas Calientes; 40° 45.55'S 72° 17.82'W; 660 m; 29.XII.1996/01.II.1997; site 982, valdivian rainforest w/ *Saxegothea* dominant, dense *Chusquea*, flight intercept trap; A. Newton & M. Thayer. – PHPC; 1 ♂ and 2 ♀; Puyehue National Park, 26.2 km E Entre Lagos, near Termas Aguas Calientes; 460 m; 40° 44.130'S 72° 18.427'W; 09-12.III.2008; sifting litter; H. Wood & C. Griswold. – PHPC; 2 ♂ and 4 ♀; Puyehue National Park on Antillanca road, 30.9 km ESE Entre Lagos, Aguas Calientes; 760 m; 40° 46.569'S 72° 15.791'W; 11-12.III.2008; H. Wood & C. Griswold. – MHNG; 2 ♂ and 10 ♀; Puyehue National Park, Anticura Repucura trail; 500 m; 06.II.1985; forest litter; S. & J. Peck. –

FMNH (FMHD #85-996, #85-113); 2 ♀; same data. – FMNH (FMHD# 96-250); 6 ♂; Puyehue National Park, 4 km E Anticura; 40° 39.73'S 72° 08.10'W; 460 m; 30.XII.1996/30.I.1997; site 985-1, valdivian rainforest w/ large, *Saxegothea*; flight intercept trap; A. Newton & M. Thayer. – FMNH (FMHD# 97-4); 3 ♂ and 1 ♀; same data, but 01-30.I.1997; 985-2. – FMNH (FMHD# 97-5); 10 ♂; same data, but 30.I.1997; site 985-3. – FMNH (FMHD# 97-39); 1 ♂ and 2 ♀; same data, but berlese, leaf & log litter. – FMNH (FMHD# 97-41); 3 ♂ and 5 ♀; same data, but site 985-1. – FMNH (FMHD# 97-40); 1 ♂ and 12 ♀; same data, but site 985-2, berlese, leaf and log litter. – FMNH; 1 ♂ and 5 ♀; Puyehue National Park, 4.1 km E Anticura; 430 m; 19-26.XII.1982; trap site 662, valdivian rainforest; A. Newton & M. Thayer. – FMNH (FMHD #2002-90); 3 ♂ and 8 ♀; Puyehue National Park, Ruta 215; km 4.5 of Aduana station; 40° 40.23'S 72° 05.21'W; 580 m; 19.XII.2002; site 1071, valdivian rainforest, berlese, leaf & log litter; A. Newton, M. Thayer, D. J. Clarke & M. Chani. – MHNG; 1 ♂ and 2 ♀; 3 km S Maicolpué, Bahia Mansa; 200 m; 21.XII.1984; mixed forest litter; S. & J. Peck. – MHNG; 2 ♂ and 17 ♀; same locality; 03.II.1985; mixed forest litter; S. & J. Peck. – FMNH (FMHD #2002-083); 6 ♂ and 7 ♀; Vicente Perez Rosales National Park, SW slope Volcàn Osorno, road to Ref. La Picada; 41° 01.05'S 72° 32.90'W; 430 m; 16.XII.2002; site 1068, *Nothofagus dombeyi* w/conifers, berlese, leaf & log litter; A. Newton, A. Solodovnikov & M. Chani. – FMNH (FMHD #2002-82); 2 ♂ and 25 ♀; Vicente Perez Rosales National Park, SW slope Volcàn Osorno, road to Ref. La Picada 41° 03.25'S 72° 30.18'W; 660 m; site 1067, *Nothofagus dombeyi* w/ conifers dense *Chusquea* bamboo understory, flat area, berlese, leaf & log litter; A. Solodovnikov, A. Newton & M. Thayer. – Región Los Ríos: Ranco prov.: MHNG; 10 ♂ and 27 ♀; 35 km WNW La Unión; 700 m; 07.II.1985; forest mixed litter; S. & J. Peck. – Valdivia prov.: NHMW; 3 ♂ and 2 ♀ (1 ♂ and 1 ♀ sub *A. denticornis*); Cordillera de la Costa, Mehuín; H. Franz. – PCPH; 5 ♀; Oncol Park, 12 km NW Valdivia, Sendero Bonifacio; WDS-T-201; 39° 42'S 73° 19'W; 22.II.2008; sifting litter; W. D. Shepard. – PHPC; 1 ♀; Valdivia; 485 m; T. Cekalovic. – Región Araucanía: Cautín prov.: FMNH (FMHD #85-999, #85-116); 1 ♂ and 1 ♀; 15 km NE Villarrica, Flor del Lago; 500 m; 10.II.1985; site 16, forest litter; S. & J. Peck. – Malleco prov.: MHNG; 1 ♂; Purén, Contulmo Natural Monument; 350 m; 11.XII.1984-13.II.1985; S. & J. Peck 85-16.

Description: Body 1.35-1.55 mm long, dark brown with reddish elytra, sometimes darker apically, and along sutural stria; antennae and legs reddish or reddish-brown; palpi yellowish. Pronotum with disc moderately convex; posterior portion of lateral margins slightly converging. First abdominal tergite with diverging basal

striae extending to about one-fourth of paratergal length, separated at base by more than one-third of tergal width.

Male: Head as in Figs 51-54, very wide, with occipital region and basal half of frons raised in two quadrangular protuberances, wider than long, and separated by large U-shaped median notch; lateral arms of notch densely pubescent apically; anterior portion of frons deeply excavated; median apophysis curved and directed backwards, originating inside median notch from very broad median sub-basal clypeal hump, tip in dorsal view triangle with densely pubescent sides; median sub-basal clypeal hump covered by very thick and long converging bristles. The head morphology of all the male specimens examined does not show significant differences. Antennae (Fig. 12) with scape and pedicel longer than wide; antennomeres III-VIII wider than long; antennomere IX slightly wider than VIII and wider than long; antennomere X distinctly wider than long and wider than IX; antennomere XI very elongate, a little longer than VI-X combined, bearing occasionally one long subbasal setae on mesal margin. Distal half of metaventrite pubescent, raised at middle on two thirds of its distal portion, this surface entirely divided by medial sulcus. Protochanters (Fig. 22) bearing one long seta; mesotrochanters (Fig. 29) with ventral margin forming spine on basal third; mesofemora (Fig. 29) with ventral margin covered by broad, short and thick setae on basal third; mesotibiae with medial margin forming short and rounded apical spine, without setae (Fig. 40) except for specimen from Malleco (Fig. 41) with some setae there that are not recurved; apical margin forming very small second spine. Aedeagus (Fig. 1) 0.30-0.32 mm long, with suboval dorsal plate, dorsal longitudinal struts slightly divergent. Parameres relatively wide with large seta on small outer lobe; tips of parameres slightly enlarged, laterally pointed, bearing small broad median seta. Copulatory pieces consisting of pair of thin and subequal lateral sclerites that are sharp and laterally curved at their apices, with pair of long and wide medial sclerites recurved and sclerotized at bases, and with distal half frayed as numerous long and thin spines.

Female: Similar to male except body sometimes paler than male, head not modified with frons slightly depressed medially behind sparsely impressed frontal sulcus.

Collecting data: Collected from October to April in different types of forest, at elevations ranging from 110 m to 1000 m. Most of the specimens came from sifted samples of leaf and log litters, sometimes including moss and vegetational debris, but a number of males of this species have also been collected by flight intercept traps, window traps, and car netting.

Distribution: *Achilia grandiceps* is distributed in southern and central Chile (Fig. 83: green diamonds) from Chiloé province to Malleco province.

Comments: Jeannel (1962: 422) described two sub-

species (*A. grandiceps grandiceps* and *A. grandiceps delamarei*), distinguishing them by the following characters of the male head: 1) an apical tuft of setae on each side of median apophysis in *A. g. grandiceps* (without apical tuft of setae in *A. g. delamarei*); 2) two densely pubescent lobes covering the semicircular sulcus at the base of the clypeus in *A. g. grandiceps* (no trace of pubescence at the base of the clypeus in *A. g. delamarei*).

We have examined the holotype of *A. grandiceps grandiceps* Jeannel, 1962 and the lectotype of *A. grandiceps delamarei* Jeannel, 1962, and found that in addition to the differences outlined by Jeannel (though some not well-described) the males of these two taxa differ also significantly with respect to the morphology of the head (cfr. Figs 51-54 and 55-58), antennae (cfr. Figs 12 and 13), mesotibiae (cfr. Figs 40-41 and 42), and lateral sclerites of the copulatory pieces of the aedeagus (cfr. Figs 1 and 2). Examination of abundant additional specimens pertaining to these two taxa has shown that these differences are stable, and that there are not intermediate character states even in where they occur together. Moreover, even the females of these two taxa can be distinguished by the following characters: 1) antennomeres III and V longer than wide in *A. g. delamarei* (transverses or at most as long as wide in *A. g. grandiceps*); 2) Frontal sulcus well-impressed in *A. g. delamarei* (scarsely impressed in *A. g. grandiceps*); 3) anterior margin of frontal lobe slightly pointed in *A. g. delamarei* (straight in *A. g. grandiceps*); 4) median part of frons distinctly depressed behind frontal sulcus in *A. g. delamarei* (slightly depressed in *A. g. grandiceps*). Also, the shape of the pronotum is slightly different: disc more convex, and with lateral margins subparallel in posterior portion in *A. g. delamarei* (disc less convex, lateral margins convergent in posterior portion in *A. g. grandiceps*). Based on these observations, we decided to raise the two subspecies proposed by Jeannel to species level, and to treat them accordingly – i.e. *A. grandiceps* Jeannel, 1962 (**stat. nov.**) and *A. delamarei* Jeannel, 1962 (**stat. nov.**).

We have also examined the holotype of *A. alticola* Jeannel, 1962. It corresponds in all the characters of the external morphology (head, antennae, metaventrite, legs, etc.) to *A. grandiceps* Jeannel, 1962, and consequently we consider *A. alticola* Jeannel, 1962 as a junior synonym of *A. grandiceps* Jeannel, 1962 (**syn. nov.**).

Achilia delamarei Jeannel, 1962 (**stat. nov.**)

Figs 2, 13, 23, 30, 42, 55-58, 83

Achilia grandiceps delamarei Jeannel, 1962: 421, 422.

Type material (4 ex.): SOUTHERN ARGENTINA: Rio Negro prov.: MNHN; 1 ♂ (lectotype, here designated); labels verbatim “Lectotype / Nahuel Huapi, B31, Cl. Delam. / *grandiceps* (handwritten by

Jeannel) / *Achilia delamarei* ♂, Sabella, Cuccodoro & Kurbatov det. 2019". – MNHN; 1 ♀ (paralectotype, here designated); same data as lectotype. – MNHN; 2 ♀ (paralectotypes, here designated); labels verbatim "Paralectotype / Parc Nat. Nahuel Huapi, B27 / *Achilia delamarei* ♀, Sabella, Cuccodoro & Kurbatov det. 2019".

Additional material examined (141 ex.): SOUTHERN AND CENTRAL CHILE: Región Aysén: Aysén prov.: MHNG; 1 ♀; 30 km N Puyuhuapi; 100 m; 29.I.1985; site 107, sifted moss on logs; S. & J. Peck. – Región Los Lagos: Palena prov.: MHNG; 20 ♂ and 58 ♀; 4 km NW Chaitén; 10 m; 30.I.1985; mixed forest litter, sooty fungus, berlese, S. & J. Peck. – FMNH (FMHD #85-991, P #85-108); 2 ♂ and 5 ♀; same data; S. & J. Peck. – PCTS; 12 ♀; Homopirén, 41° 87'S 72° 36'W; 17.XII.2013; forest layer. – MHNG; 1 ♂ and 1 ♀; same data. – Osorno prov.: UNHC; 1 ♂ and 1 ♀; Puyehue National Park, 4.1 km E Anticura; 430 m; 19-26. XII.1982; trap site 662, valdivian rainforest; A. Newton & M. Thayer. – FMNH; 8 ♀; same data. – FMNH (FMHD# 97-5); 1 ♂; Puyehue National Park, 4 km E Anticura; 40° 39.73'S 72° 08.10'W; 460 m; 30.I.1997; site, 985-3 valdivian rainforest w/large *Saxegothea*, flight intercept trap; A. Newton & M. Thayer. – MHNG; 2 ♂; Puyehue National Park, Aguas Calientes; 500 m; 20.XII.1984-08.II.1985; *Nothofagus* forest; S. & J. Peck. – PCTS; 2 ♂ and 5 ♀; Aguas Calientes, 40° 74'S 72° 30'W; 13.XII.2013; car net. – PCTS; 3 ♂ and 7 ♀; Aguas Calientes, 40° 74'S 72° 27'W; 14.XII.2013; litter layer. – FMNH (FMHD #2002-083); 1 ♀; Vicente Perez Rosales National Park, SW slope Volcán Osorno, road to Ref. La Picada; 41° 01.05'S 72° 32.90'W; 430 m; 16.XII.2002; site 1068, *Nothofagus dombeyi* w/conifers, berlese, leaf & log litter; A. Newton, A. Solodovnikov & M. Chani. – Región Araucanía: Cautín prov.: MHNG; 1 ♂ and 9 ♀; Huerquehue National Park; 800-900 m; 22-24.XII.1980; site 16a, forest litter; D. Agosti & D. Burckhardt.

Description: Body 1.55-1.75 mm long, dark brown with reddish elytra, sometimes darker basally and apically, and along sutural stria; antennae and legs reddish or reddish-brown; palpi yellowish. Pronotum with disc slightly more convex than in *A. grandiceps*; posterior portion of lateral margins subparallel. First abdominal tergite with diverging basal striae extending to about one-fourth of paratergal length, and separated at base by about one-third of tergal width.

Male: Head as in Figs 55-58, similar to that of *A. grandiceps* except: the two quadrangular protuberances wider than long, and separated by U-shaped median notch narrower at base than that for *A. grandiceps*; lateral arms of notch densely pubescent apically; anterior portion of frons very deeply excavated; median apophysis originating from very broad median sub-basal clypeal hump, tip in dorsal view lozenge-shaped with pubescent

sides; median sub-basal clypeal hump with sides sharply margined and bearing only some short setae. Also in this species the head morphology of all the male specimens does not show substantial differences. Antennae (Fig. 13) with scape slightly longer than wide and slightly enlarged on lateral margin; pedicel distinctly longer than wide; antennomere III longer than wide; antennomere IV as wide as long; antennomere V longer than wide; antennomeres VI-VIII wider than long; antennomere IX wider than VIII and wider than long; antennomere X wider than long; antennomere XI elongate, and longer than VII-X combined. Metaventrite with distal half pubescent, raised at middle for two thirds of its distal portion, this surface entirely divided by broad medial sulcus. Protrochanters (Fig. 23) bearing one long seta; mesotrochanters (Fig. 30) with ventral margin forming spine on basal third; mesofemora (Fig. 30) with ventral margin covered by broad, short and thick setae on basal third, these setae longer than in *A. grandiceps*; mesotibiae with medial margin forming short and rounded apical spine, always with recurved setae (Fig. 42); apical margin forming second tiny spine at middle. Aedeagus (Fig. 2) 0.32-0.33 mm long, similar to that of *A. grandiceps* except lateral sclerites thicker, distinctly pointed and apically recurved, and medial sclerites with two-thirds of distal portion frayed and bearing numerous long and thin spines.

Female: Similar to male except body sometimes paler than male, head not modified with frons depressed behind frontal sulcus which is well-impressed, and anterior margin of frontal lobe pointed at middle.

Collecting data: Collected from December to March in different types of forests, at elevations ranging from 10 m to 900 m. Most specimens came from sifted samples of leaf and log litter, and some males have also been collected by flight intercept traps and car netting.

Distribution: *Achilia delamarei* is distributed in southern Argentina and southern and central Chile (Fig. 83: red squares) ranging from Aysén province to Cautín province.

Comments: Jeannel (1962: 422) in the original description mentions 1 male and 3 females collected by Cl. Delamare in March 1959 in the province of Rio Negro (Argentina) in the Nahuel Huapi reserve (about 41° latitude S) at an altitude of about 1000 meters, and claimed (l. c.: 421) that the type of this taxon is in the MNHN collections. In the general collection of Chilean Pselaphinae at the MNHN we found 1 male and 3 females labeled as being from Nahuel Huapi, with only the male bearing a label "*grandiceps* (handwritten by Jeannel)", and none bearing red "Type" labels. For this reason, we designate here the only male of this series as the lectotype and the 3 females as paralectotypes. The lectotype of *A. delamarei* has all antennomeres slightly longer than those of the other males examined,

in particular the pedicel is two times longer than wide, while in the other males it is typically one and a half times longer than wide. For the distinctive characters that separate *A. delamarei* and *A. grandiceps* see the “Comments” section under *A. grandiceps*.

***Achilia jeanneli* n. sp.**

Figs 3, 17, 24, 32, 45-46, 59-62, 83

Holotype: MHNG (# MHNG-ENTO-81519); 1 ♂; CENTRAL CHILE: Región Araucanía: Malleco prov.: Nahuelbuta National Park, Piedra del Aquila; 37° 48'S 73° 02'W; 1300 m; 24.XII.1992; site 31b, sifting of moss on rock and tree trunks and vegetational debris; D. Burckhardt.

Paratypes (70 ex.): CENTRAL CHILE: Región Araucanía: Malleco prov.: MHNG (# MHNG-ENTO-81520-29); 7 ♂ and 3 ♀; same data as holotype. – MHNS; 1 ♂ and 1 ♀; same data. – MHNG (# MHNG-ENTO-81530-73); 9 ♂ and 35 ♀; Nahuelbuta National Park, Piedra del Aquila; 1450 m; 15.XII.1990; site 10a, sifting of vegetational debris; M. Agosti & D. Burckhardt. – FMNH (FMHD #2002-045); 2 ♀; Nahuelbuta National Park, road to Piedra del Aquila; 37° 49.29'S 73° 01.90'W; 1360 m; 06-24.XII.2002; site 1055, *Nothofagus dombey* & *pumilio*, large *Araucaria* and bamboo, shrub understory; flight intercept traps; M. Thayer, A. Newton, A. Solodovnikov, D. J. Clarke & M. Chani. – FMNH (FMHD #2002-096); 2 ♀; Nahuelbuta National Park, road to Piedra del Águila; 37° 49.7'S 73° 01.9'W; 1360 m; 25.XII.2002; *Nothofagus* and *Araucaria*, berlese, leaf & log litter; A. Solodovnikov. – MHNG (# MHNG-ENTO-81574-79); 3 ♂ and 3 ♀; Nahuelbuta National Park; 1100 m; 14-17.XII.1990; site 9a, forest litter; M. Agosti & D. Burckhardt. – NHMW; 1 ♂ and 2 ♀; Cordillera Nahuelbuta; H. Franz. – FMNH (FMHD #96-224); 1 ♀; Nahuelbuta National Park, 4.5 km W Los Portones entrance; 37° 49.25'S 72° 59.82'W; 1300 m; 21.XII.1996; site 975, *Nothofagus* spp. emergent *Araucaria aracauna*, *Chusquea* understory, berlese, leaf & log litter; A. Newton & M. Thayer.

Description: Body 1.60-1.70 mm long, brown with reddish elytra, sometimes also head and pronotum reddish; antennae and legs reddish; palpi yellowish. Pronotum with disc slightly more convex than in *A. grandiceps*; posterior portion of lateral margins subparallel. First abdominal tergite with diverging basal striae extending to about one-fourth of paratergal length, and separated at base by about one-third of tergal width. **Male:** Head as in Figs 59-62, with occipital region and basal half of frons raised as two triangular protuberances, longer than wide, and separated by U-shaped median notch; lateral arms of notch thickly pubescent apically; anterior portion of frons deeply excavated; median

apophysis curved and directed backwards, originating from broad median sub-basal clypeal hump, tip in dorsal view horseshoe-shaped with pubescent sides; median sub-basal clypeal hump with sides bearing only some sparse setae. Antennae (Fig. 17) with scape longer than wide, slightly swollen and slightly flattened; pedicel wider than long, slightly excavated on medial surface and with broadened lateral margin; antennomere III about as long as wide, antennomeres IV-VIII wider than long and slightly swollen; antennomere IX transverse with protruding mesal margin pointed at middle, antennomere X wider than long with denticulate margins and protruding mesal margin pointed at middle; antennomere XI elongate, with denticulate margins, shorter than VII-X combined. Metaventrite entirely covered by dense pubescence formed by long converging bristles, raised at middle for two-thirds of its distal portion, this surface entirely divided by broad median sulcus. Protochanters with ventral margin forming median spine rounded or apically truncate, with long bristle at base of spine (Fig. 24); mesotrochanters (Fig. 32) with ventral margin forming spine on basal third; mesofemora (Fig. 32) with ventral margin similar to those of *A. grandiceps*, covered by broad, short and thick setae on basal third; mesotibiae with medial margin bearing recurved setae (Fig. 45), or not (Fig. 46), and forming short apical spine. Aedeagus (Fig. 3) 0.43-0.44 mm long; similar to that of *A. grandiceps* except lateral sclerites shorter, distinctly pointed and apically bent outwards.

Female: Similar to male except head not modified with frons slightly depressed behind scarcely impressed frontal sulcus.

Collecting data: Collected in December in different types of forest, at elevations ranging from 1110 m to 1450 m. All specimens came from sifted samples of leaf and log litter, sometimes with moss and vegetational debris included. Two females were collected by flight intercept traps.

Distribution: The species is known only from central Chile (Fig. 83: fuchsia star) in Nahuelbuta National Park (Malleco province).

Etymology: The species is dedicated to the French entomologist R. Jeannel.

Comments: Within the *A. grandiceps* group, the males of *A. jeanneli* n. sp. are easily distinguished from the other species by the shape of the head (Figs 59-62) and antennae (Fig. 17). The females of this species are very similar to those of *A. grandiceps*, from which they can be distinguished by their larger body size (1.6-1.7 mm for *A. jeanneli* versus 1.35-1.55 mm for *A. grandiceps*), and by the slightly swollen antennal scape of *A. jeanneli* n. sp.

Achilia franzi n. sp.

Figs 4, 14, 25, 33, 47-48, 63-66, 83

Holotype: MHNG (# MHNG-ENTO-81580); 1 ♂; SOUTHERN CHILE: Región Los Lagos: Llanquihue prov.: Alerce Andino National Park, Laguna Triángulo; 41° 40'S 72° 35'W; 550 m; 05-06.I.1993; sclerophyll rainforest, site 38b, sifting of moss on tree trunks and forest floor, and of vegetational debris; D. Burckhardt.

Paratypes (96 ex.): SOUTHERN CHILE: Región Los Lagos: Llanquihue prov.: MHNG (# MHNG-ENTO-81581-672); 51 ♂ and 40 ♀; same data as holotype. – MNHS; 1 ♂ and 1 ♀, same data. – Osorno prov.: UNHC; 1 ♂; Puyehue National Park, Antillanca road; 690 m; 18-24.XII.1982; site 661, valdivian rainforest, window trap; A. Newton & M. Thayer. – FMNH; 1 ♂; same data. – MHNG (# MHNG-ENTO-81673); 1 ♂; Puyehue National Park, Antillanca road; 500-1000 m; 18-20.XII.1984; car netting; S. & J. Peck.

Description: Body 1.45-1.60 mm long, dark brown with reddish elytra; antennae and legs reddish, palpi yellowish. Pronotum with disc moderately convex; posterior portion of lateral margins subparallel. First abdominal tergite with diverging basal striae extending to about one-fourth of paratergal length, and separated at base by more than one-third of tergal width.

Male: Head as in Figs 63-66, with occipital region and basal half of frons raised with V-shaped median notch; lateral arms of notch densely pubescent apically; anterior portion of frons deeply excavated; median apophysis curved and directed backwards, originating from very large median sub-basal clypeal hump, tip in dorsal view fusiform; sub-basal clypeal hump sparsely pubescent. Antennal tubercles very prominent. Antennae (Fig. 14) with scape and pedicel distinctly longer than wide; antennomeres III and V distinctly longer than wide; antennomeres IV and VI-VIII wider than long; antennomere IX wider than long with protruding mesal margin pointed at distal angle; antennomere X wider than long, with protruding mesal margin; antennomere XI elongate, slightly longer than VII-X combined, with denticulate margins. Metaventrite with distal half pubescent, raised at middle for two thirds of its distal portion, this surface entirely divided by median sulcus. Protochanters (Fig. 25) bearing one long seta; profemora slightly enlarged at middle and slightly hollowed medially near ventral margin; mesotrochanters (Fig. 33) with ventral margin forming spine at basal third; mesofemora (Fig. 33) with basal third of ventral margin covered by broad, short and thick setae, very similar to mesofemora of *A. jeanneli* n. sp.; mesotibiae with medial margin bearing recurved setae (Fig. 48), or not recurved (Fig. 47) and forming very short and rounded apical spine; apical margin denticulate. Aedeagus (Fig. 4) 0.27-0.29 mm long; similar to that of *A. grandiceps* except

parameres wider with larger outer lobe, and copulatory pieces with lateral sclerites wider, longer, pointed and apically bent outwards.

Female: Similar to male except: head not modified, but frons flattened behind frontal sulcus, which is well impressed, anterior margin of the frontal lobe pointed in the middle.

Collecting data: Collected from December to January in sclerophyll or valdivian rainforest, at elevations ranging from 550 m to 1000 m. The specimens came from sifted samples of moss and vegetational debris, windows traps, and car netting.

Distribution: *Achilia franzi* n. sp. is known only from southern Chile (Fig. 83: squares edged in fuchsia) in Llanquihue and Osorno provinces (Región Los Lagos).

Etymology: This species is dedicated to the Austrian entomologist H. Franz.

Comments: Within the *A. grandiceps* group, the males of *A. franzi* n. sp. are easily distinguished from the other species by the peculiar shape of their head (Figs 63-66) and antennae (Fig. 14). The females of this species are characterized by antennomeres wider than long, or at most as wide as long, the frontal sulcus well-impressed, the anterior margin of frontal lobe distinctly pointed in middle, and the frons flattened behind the frontal sulcus.

Achilia elguetai n. sp.

Figs 5, 15, 26-27, 34, 37, 49, 67-70, 83

Holotype: MHNG (# MHNG-ENTO-81674); 1 ♂; SOUTHERN CHILE: Región Los Lagos: Chiloé prov.: Isla Chiloé, Vilupulli; 26.II.1976; T. Cekalovic.

Paratypes (29 ex.): SOUTHERN CHILE Región Los Lagos: Chiloé prov.: MHNG (# MHNG-ENTO-81675-80); 6 ♀; same data as holotype. – MSNG; 1 ♂; Puente La Caldera, 15.II.1996; site TC-466; T. Cekalovic. – FMNH (FMHD# 97-21); 5 ♂ and 5 ♀; Puente La Caldera, 9.8 km E of Cucao; 42° 39.96'S 74° 00.70'W; 10 m; 14.I.1997; site 991, valdivian rainforest, berlese, leaf & log litter; A. Newton & M. Thayer. – MHNG (# MHNG-ENTO-81681-82); 1 ♂ and 1 ♀; same data. – MNHS; 1 ♂ and 1 ♀; same data; A. Newton & M. Thayer 991. – MHNG (# MHNG-ENTO-81683-84); 2 ♀; Isla Chiloé, Castro; 26.II.1976; T. Cekalovic. – MHNG (# MHNG-ENTO-81685); 1 ♂; Chiloé National Park, Rancho Grande, near Cucao; 42° 33'S 74° 02'W; 250-400 m; 29.XII.1992; site 35b, sifting of moss on forest floor trees and vegetational debris; D. Burckhardt. – FMNH (FMHD #2002-72); 5 ♂; S side of Huillinco lake, road to Bellavista; 1.3 km S road of Cucao; 42° 41.81'S 73° 55.88'W; 45 m; 12-22.XII.2002; site 1062, valdivian rainforest w/emergent *Saxegothea conspicua*, flight intercept trap; A. Newton & M. Thayer.

Description: Body 1.60-1.70 mm long, brown with reddish, or sometimes yellowish elytra; antennae and legs reddish or yellowish; palpi yellowish. Pronotum with disc very convex; posterior portion of lateral margins suparallel. First abdominal tergite with diverging basal striae extending to about one-third of paratergal length, and separated at base by about one-third of tergal width.

Male: Head as in Figs 67-70, with occipital region and basal half of frons raised as two quadrangular protuberances, and separated by U-shaped median notch; lateral arms of notch extended anteriorly as pubescent pointed process that is densely pubescent apically; anterior portion of frons deeply excavated; median apophysis curved and directed backwards, originating from large median sub-basal clypeal hump, tip in dorsal view lozenge-shaped with pubescent sides; median sub-basal clypeal hump with sides sharp and bearing sparse bristles. Antennae (Fig. 15) with scape barely longer than wide; pedicel distinctly longer than wide; antennomeres III-V distinctly longer than wide; antennomere VI slightly longer than wide; antennomeres VII and VIII wider than long; antennomeres IX-X transverse with slightly protruding lateral margin, antennomere X wider than IX; antennomere XI elongate with denticulate margins, and shorter than VII-X combined. Metaventricle with distal half densely pubescent, raised at middle for two-thirds of its distal portion, this surface entirely divided by median sulcus. Protrochanters with one long seta and some shorter setae, ventral margin forming median spine (Fig. 26), this spine sometimes truncate (Fig. 27); protibiae (Fig. 37) strongly recurved and sinuate for distal half; mesotrochanters with ventral margin forming sharp spine at basal third (Fig. 34); mesofemora (Fig. 34) with basal third of ventral margin covered by broad, short and thick setae, similar to those of *A. jeanneli* n. sp.; mesotibiae with medial margin without recurved setae (Fig. 49), forming very short and rounded apical spine; apical margin forming very small second spine. Aedeagus (Fig. 5) 0.31-0.32 mm long; very similar to that of *A. delamarei* except parameres slightly wider, and copulatory pieces with medial sclerites with only the distal third frayed with numerous long and thin spines.

Female: Similar to male except head not modified with frons flattened, and frontal sulcus scarcely impressed.

Collecting data: Collected from December to February in valdivian rainforest at elevations ranging from 10 m to 400 m. The specimens came from sifted samples of leaf & log litter, or from moss and vegetational debris, some also collected by flight intercept traps.

Distribution: *Achilia elguetai* n. sp. is known only from southern Chile (Fig. 83: red inverted triangles) in Chiloé province (Región Los Lagos).

Etymology: This species is dedicated to the Chilean entomologist M. Elgueta Donoso.

Comments: *Achilia elguetai* n. sp. is easily distinguished from the other species of the *A. grandiceps* group by the peculiar characters of the males, especially the features of the head (Figs 67-70), the antennae (Fig. 15), and the protibiae (Fig. 37). The females of this species are characterized by their very large head, which is flattened but not excavated behind the scarcely impressed frontal sulcus, the frontal lobe is distinctly pointed at the middle, the antennae have antennomeres III and V distinctly longer than wide, antennomeres VI and VII are slightly longer than wide, and the protibiae are enlarged for their distal half.

Achilia denticornis Jeannel, 1962

Figs 7-8, 16, 21, 38, 44, 71-74, 83

Achilia denticornis Jeannel, 1962: 421, 423 figs 183 (head and antennae), 184 (aedeagus).

Type material (27 ex.): SOUTHERN CHILI: Región Los Lagos: Chiloé prov.: MHNS; 1 ♂ (holotype); labels verbatim “Type / Chepu, 03.X.1958, G. Kuschel / *Achilia denticornis* / *denticornis* (handwritten by Jeannel) / CHILE, M.N.H.N., Typo, n. 1845”. – MNHN; 13 ♂ and 11 ♀ (paratypes); labels verbatim “Paratype / Chepu, 03.X.1958, Kuschel”. – MNHN; 1 ♂ (paratype); labels verbatim “Paratype / Chepu, 04.X.1958, Kuschel”. – MNHN; 1 ♂ (paratype); labels verbatim “Paratype / Chepu, 11.X.1958, Kuschel”.

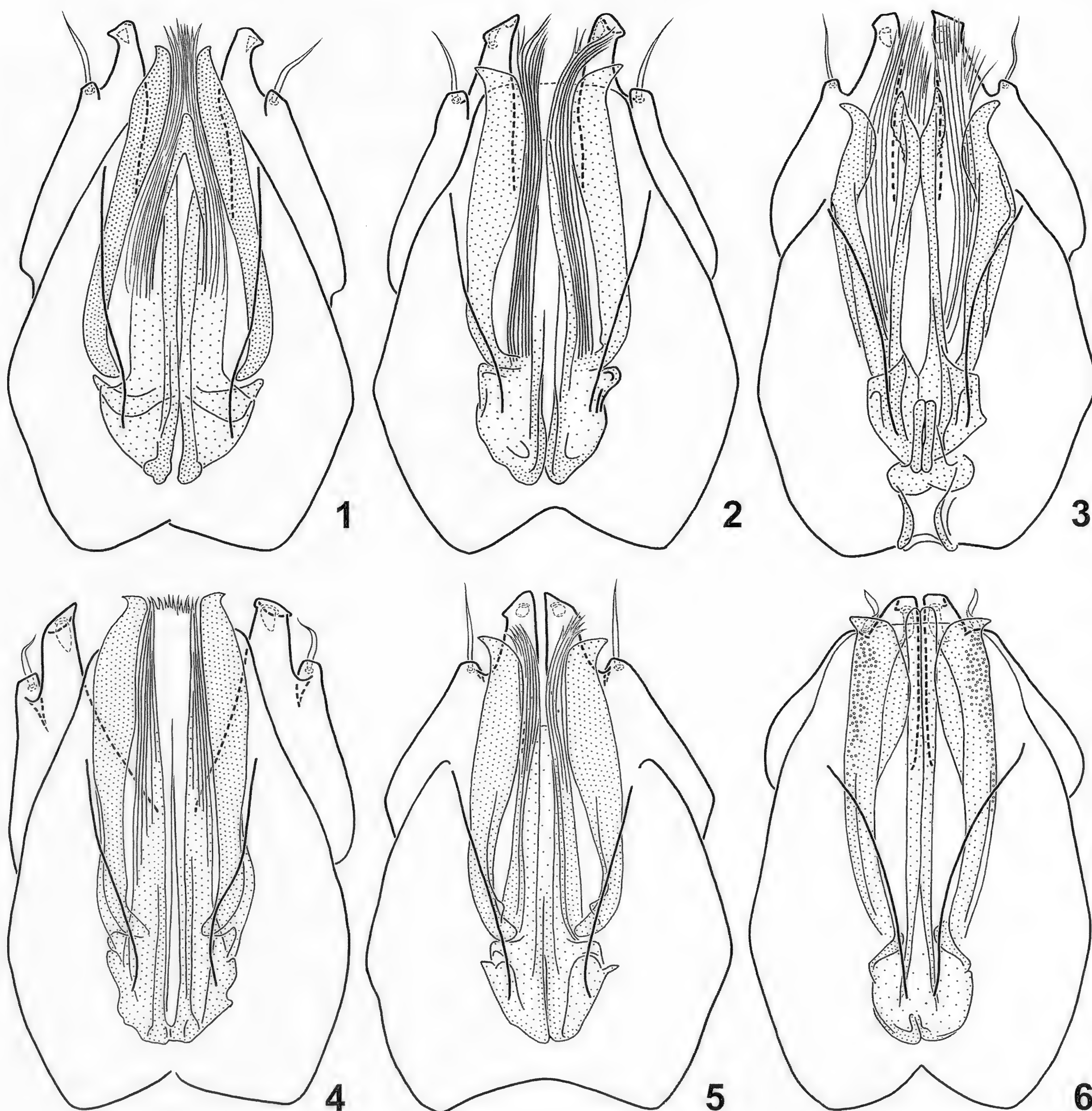
Additional material examined (48 ex.): SOUTHERN CHILI: Región Los Lagos: Chiloé prov.: MHNS; 4 ♂ and 14 ♀ (mislabelled as paratypes of *A. denticornis* n. 1846-47, n. 1849 and n. 2053-67); Chepu; 03.X.1958; G. Kuschel. – MHNS; 1 ♂ and 4 ♀ (mislabelled as paratypes of *A. denticornis* n. 1848 and 2068-71); Chepu; 04.X.1958; G. Kuschel. – MHNG; 2 ♂ and 5 ♀; Isla Chiloé, Mocopulli; 2.II.1983; T. Cekalovic. – MHNG; 1 ♀; Isla Chiloé, Piruquina; 19.II.1983; T. Cekalovic. – Llanquihue prov.: FMNH (FMHD #97-38); 2 ♂ and 1 ♀; Vicente Perez Rosales National Park, SW slope Volcan Osorno, km 4 to La Burbuja; 41° 09.95'S 72° 30.80'W; 310 m; 27.I.1997; site 1007 secondary valdivian rainforest w/*Nothofagus dombeyi* - *Eucryphia cordifolia*, berlese, leaf & log; A. Newton & M. Thayer. – FMNH (FMHD #97-16); 1 ♂ and 2 ♀; Lago Chapo, near SE end, km 9.9 on road from Rollizo; 41° 30.63'S 72° 23.98'W; 385 m; 04.I.1997; site 989, valdivian rainforest on steep slope, berlese, leaf & log litter; A. Newton & M. Thayer. – Osorno prov.: PCTS; 1 ♂; Aguas Calientes, 40° 74'S 72° 27'W; 13.XII.2013; car net. – MHNG; 1 ♂ and 7 ♀; Aguas Calientes, 40° 74'S 72° 27'W; 14.XII.2013; litter layer. – FMNH; 1 ♀; Puyehue National Park, Antillanca road; 470 m; 20-25.XII.1982; valdivian rainforest, leaf & log litter, berlese, vouchers associated with larvae; A. Newton & M. Thayer. – FMNH (FMHD #2002-90); 1 ♀; Puyehue National Park, Ruta 215; km 4.5 of Aduana station;

40° 40.23'S 72° 05.21'W; 580 m; 19.XII.2002; site 1071, valdivian rainforest, berlese, leaf & log litter; A. Newton, M. Thayer, D. J. Clarke & M. Chani.

Description: Body 1.60-1.70 mm long, dark brown with reddish elytra; antennae and legs reddish; palpi yellowish. Pronotum with disc moderately convex; posterior portion of lateral margins subparallel. First abdominal tergite with diverging basal striae extending to about one-fourth of paratergal length, and separated at base by about one-third of tergal width.

Male: Head as in Figs 71-74, with occipital region and

basal half of frons raised as two protuberances, and separated by U-shaped median notch; lateral arms of notch extended anteriorly to form pubescent pointed process; anterior portion of frons very deeply excavated; median apophysis curved and directed backwards, sides rounded, originating at base of clypeus from ridge connecting base of antennal tubercles, tip in dorsal view triangular with rounded and pubescent sides; anterior margin of transverse clypeal ridge pointed at middle. Antennae (Fig. 16) with scape and pedicel longer than wide, scape slightly swollen; antennomere III slightly longer than wide; antennomere IV slightly wider than



Figs 1-6. Aedeagi of *Achilia* species. (1) *A. grandiceps*. (2) *A. delamarei*. (3) *A. jeanneli* n. sp. (4) *A. franzi* n. sp. (5) *A. elguetai* n. sp. (6) *A. valdiviensis*.

long; antennomere V with distal third of medial margin strongly widened and forming tooth-like process bearing six long apical bristles; antennomeres VI-VIII distinctly wider than long; antennomere IX transverse with distal third of mesal margin protruding to form small tooth; antennomere X wider than long with protruding mesal margin; antennomere XI elongate, distinctly longer than VII-X combined, with margins denticulate. Metaventrite with distal half not pubescent, shiny, raised at middle on apical two-thirds of length, this surface entirely divided by broad and deep median sulcus. Protibiae (Fig. 38) slightly enlarged at middle, medial margin forming tiny apical spine; mesotrochanters (Fig. 31) with small tubercle near distal third of ventral margin; mesofemora (Fig. 31) with basal third of ventral margin covered by broad, short and thick setae, similar to those of *A. grandiceps*; mesotibiae (Fig. 44) with medial margin forming conspicuous stout spine at middle and with thin apical spine, without recurved setae. Aedeagus (Figs 7-8) 0.30-0.31 mm long; with suboval dorsal plate, dorsal longitudinal struts slightly divergent. Parameres wide without outer lobe, with enlarged and rounded apex, apex bearing three long and thin bristles. Copulatory pieces consisting of pair of stout lateral sclerites subequal in length, slightly pointed laterally and apically rounded, with pair of long, wide medial sclerites that are basally recurved and sclerotized, these sclerites frayed with numerous long and thin spines.

Female: Similar to male except antennae and head not

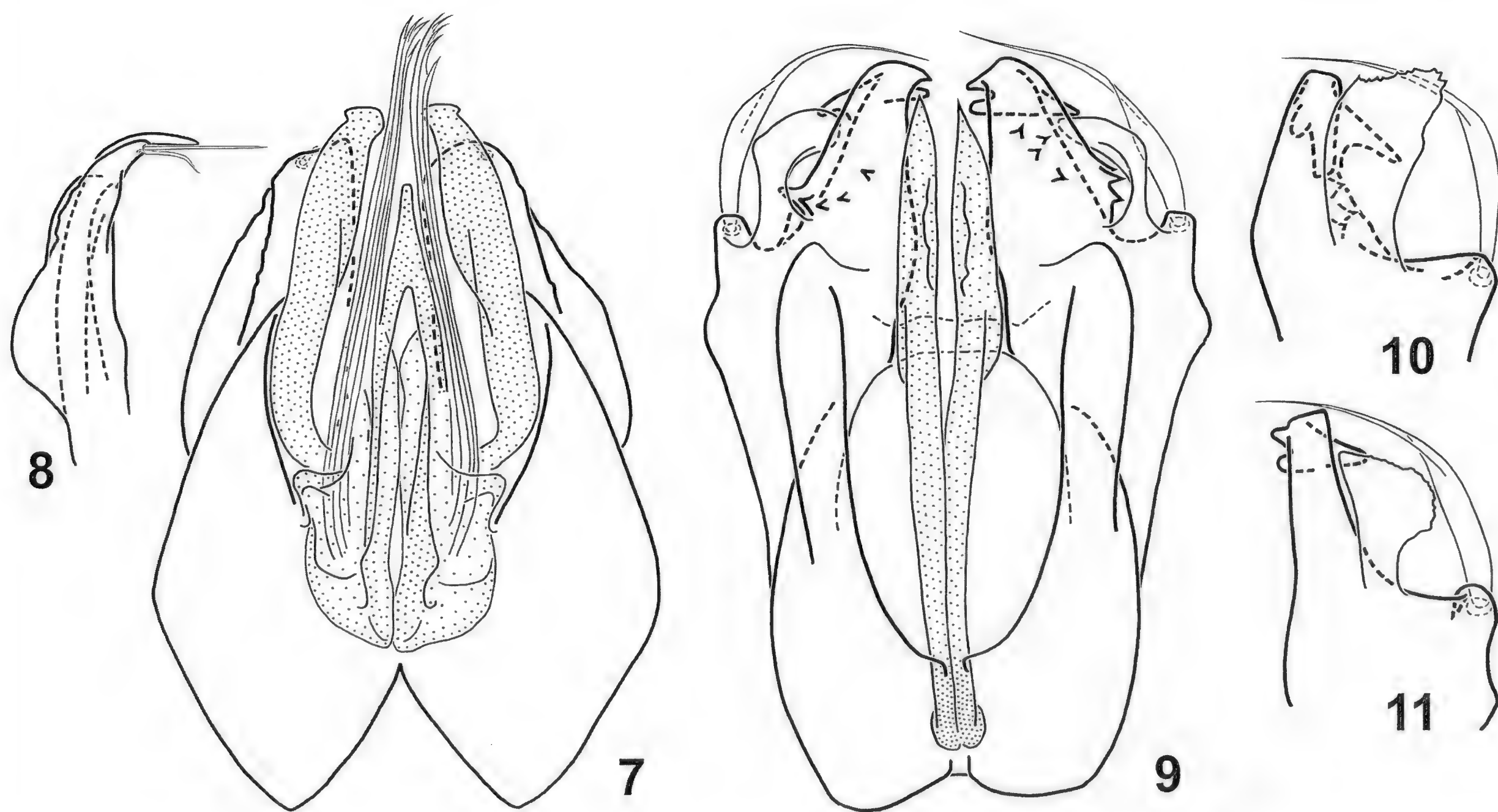
modified, with frons shallowly depressed behind scarcely impressed frontal sulcus.

Collecting data: Collected from October to February in valdivian rainforest at elevations ranging from 310 m to 580 m. All specimens came from sifted samples of leaf and log litter, except for one male collected by car net.

Distribution: The species is known only from the Los Lagos Región (southern Chile) (Fig. 83: blue triangles).

Comments: The males of *A. denticornis* are easily distinguished from the other species of the *A. grandiceps* group by the shape of their mesotibiae (Fig. 44). The form of their head (Figs 71-74), antennae (Fig. 16), protibiae (Fig. 38), and aedeagus (Figs 7-8) are also diagnostic. The females of this species are characterized by their large head with the frons shallowly depressed behind the barely impressed frontal sulcus, antennomeres III-IV are longer than wide, antennomere V is distinctly longer than wide and is longer than all other antennomeres of the funicle. Medial margin of antennomere V slightly widened in the distal third. Jeannel (1962: 423) claims that the antennomeres V of the female of *A. denticornis* possess a small tubercle with two bristles, but we did not find this feature in all the females examined.

In the original description Jeannel (1962: 423) mentions that this species was described from 50 specimens collected by Kuschel in Chepu on 3.X.1958. However, upon examination of the type series of Kuschel for the



Figs 7-11. Aedeagi (7, 9) and parameres in lateral view (8, 10-11) of *Achilia* species. (7) *A. denticornis*. (8) *A. denticornis*, same specimen. (9) *A. bicornis*, specimen from Chiloé, Mocopulli. (10) *A. bicornis*, specimen from Osorno, Bahía Mansa. (11) *A. bicornis*, specimen from Cautín, Huerquehue National Park.

dates indicated by Jeannel we found only 25 specimens (holotype and paratypes). Two other males of the typical series, that are housed in MNHN, were collected by Kuschel in Chepu and are labeled as paratypes, but were collected on different dates (i.e. 1 male paratypes on 04.X.1958; and 1 male paratypes on 11.X.1958), a detail most likely overlooked by Jeannel.

Achilia valdiviensis species group

Jeannel (1962: 398, 424) characterized this group as follows: elytra with 3 basal foveae; basal striae of first abdominal tergite separated by about a third of the tergal width; clypeus of the male head protruding in the form of a duck bill; antennae of the male with enlarged pedicel; distal end of longitudinal struts of aedeagus spatulate. The group includes *Achilia valdiviensis* (Blanchard, 1851) and *A. kuscheli* Jeannel, 1962. However our study

of the type material revealed that *Achilia kuscheli* Jeannel, 1962 is a junior subjective synonym of *A. valdiviensis* (Blanchard, 1851) (**syn. nov.**). Consequently the *A. valdiviensis* group now holds only *A. valdiviensis* (Blanchard, 1851).

Achilia valdiviensis (Blanchard, 1851)

Figs 6, 18-19, 28, 35, 39, 43, 75-78, 84

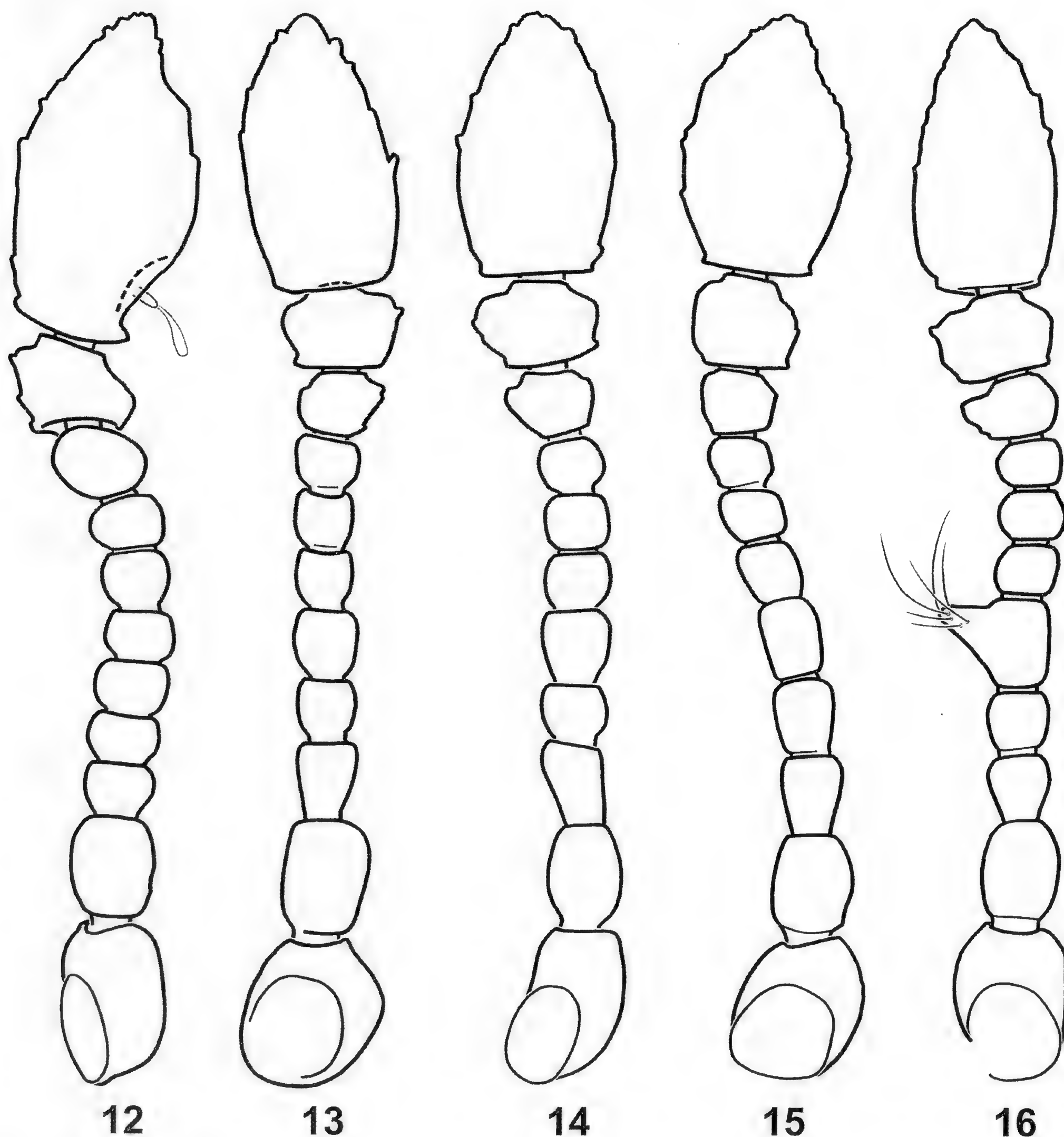
Pselaphus valdiviensis Blanchard, 1851: 563.

Achilia valdiviensis Raffray, 1904: 138; Raffray, 1908: pl. 2, fig. 13 (habitus); Jeannel, 1962: 424, fig. 189 (aedeagus); (nec *valdiviensis* Reitter, 1885).

Bryaxis nasuta Reitter, 1885a: 327, pl. 2, fig. 7 (head and antennae).

Bryaxis anas Reitter, 1885b: 317 (new name for *Bryaxis nasuta*).

Bryaxis nasina Reitter, 1893: 261 (new name for *Bryaxis nasuta*).



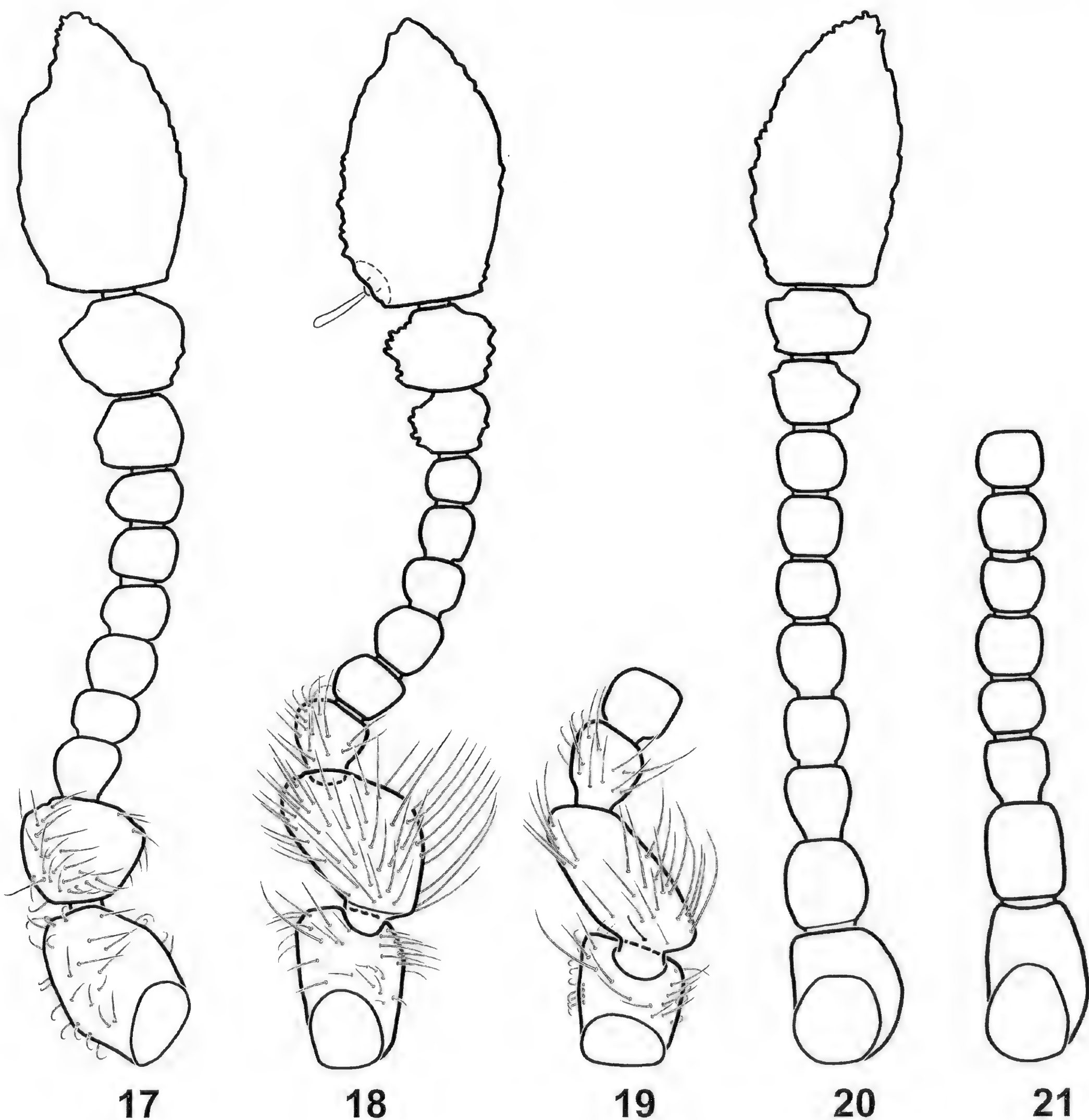
Figs 12-16. Male antennae of *Achilia* species. (12) *A. grandiceps*. (13) *A. delamarei*. (14) *A. franzi* n. sp. (15) *A. elguetai* n. sp. (16) *A. denticornis*.

Achilia kuscheli Jeannel, 1962: 424, 425, figs 186 (habitus), 187 (head of female), 188 (aedeagus) (**syn. nov.**).

Type material (14 ex.): SOUTHERN CHILE Región Los Rios: Valdivia prov.: MNHN; 1 ♂ (Lectotype, here designated); label verbatim: “Lectotype / Museum Paris, Chili, Gay 1849 / H 49 / Valdivia / Gen. *Achilia* Reitt. =, *Bryaxis* Raffr., = *Pselaphus* Blanchard / *valdiviensis*, Blanch. = *nasina* Reitter, = *nasuta* Reitt., A. Raffray det. 1904 / *valdiviensis* Bl. (handwritten by Jeannel) / *Achilia valdiviensis* Sabella, Cuccodoro & Kurbatov det. 2019”. – MNHN; 1 ♂ (Paralectotype, here designated); label verbatim: “Paralectotype / Museum Paris, Chili, Gay 1849 / H 49 / Valdivia / *Achilia valdiviensis* Blch., A. Raffray det. 1904 / *Achilia valdiviensis* Sabella, Cuccodoro & Kurbatov det. 2019”. Región Los Lagos: Chiloé prov.: MHNS;

1 ♂ (holotype of *A. kuscheli*); labels verbatim “Type / Chepu, 03.X.1958, G. Kuschel / *Achillia kuscheli* / *kuscheli* (handwritten by Jeannel) / CHILE; M.N.H.N.; Typo, n. 1850”. – MNHN, 1 ♂ and 9 ♀ (paratypes of *A. kuscheli*); labels verbatim “Paratype / Chepu, 03.X.1958, Kuschel”. – MNHN; 1 ♀ (paratype of *A. kuscheli*); labels verbatim “Paratype / Chepu, 11.X.1958, Kuschel”.

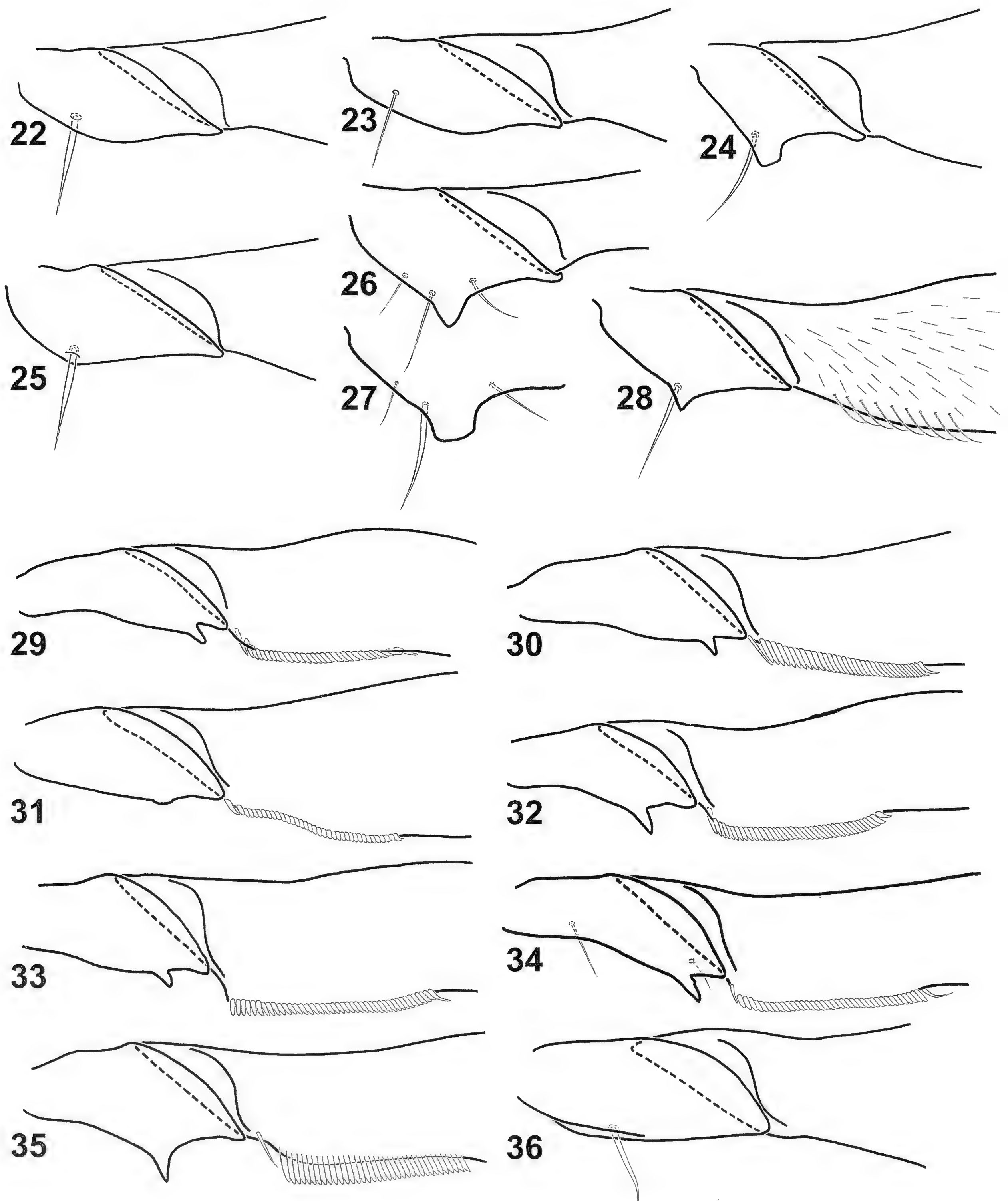
Additional material examined (65 ex.): MNHN; 1 ♂ (probably holotype of *A. nasina* Reitter, 1893); labels verbatim “Chili / Museum Paris, 1917, coll. Raffray / Type / *chilensis* Reitter / *A. valdiviensis*, A. Raffray det. / *valdiviensis* Bl. (handwritten by Jeannel)”. SOUTHERN CHILE: Región Los Lagos: Chiloé prov.: MHNG; 1 ♂; Chiloe; H. Franz. – MHNS; 7 ♀ (mislabelled as paratypes of *A. kuscheli* n. 1851 and



Figs 17-21. Male antennae (17-18, 20), and variability of the base of antennae (19-21) of *Achilia*. (17) *A. jeanneli* n. sp. (18) *A. valdiviensis*, specimen from Valdivia, Reserva Costera Valdiviana, Chaihuín. (19) *A. valdiviensis*, specimen from Chiloé, Puente La Caldera. (20) *A. bicornis*, specimen from Chiloé, Mocopulli. (21) *A. bicornis*, specimen from Osorno, Bahía Mansa.

n. 2072-77); Chepu; 03.X.1958; G. Kuschel. – FMNH (FMHD# 97-21); 15 ♂ and 17 ♀; Puente La Caldera, 9.8 km E of Cucao; 42° 39.96'S 74° 00.70'W 10 m; 14.I.1997; site 991, valdivian rainforest, berlese, leaf

& log litter; A. Newton & M. Thayer. – MHNG; 7 ♂ and 6 ♀; same data. – MHNS; 2 ♂ and 2 ♀; same data. – PCPH; 1 ♂ and 1 ♀; same data. – Región Los Ríos: Valdivia prov.: MHNG; 1 ♂; Corral, 39° 95'S



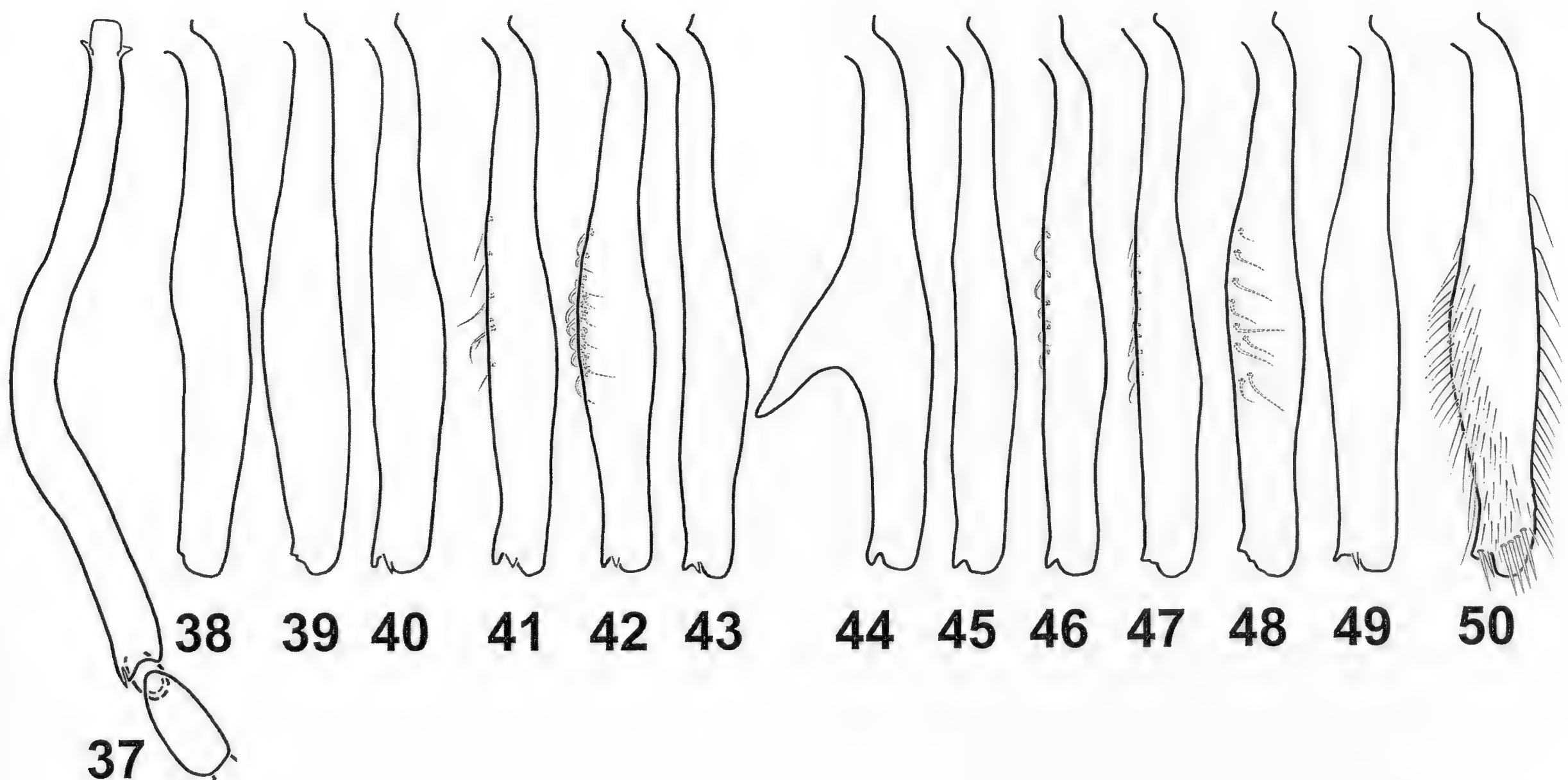
Figs 22-36. Male protrochanters (22-28), mesotrochanters and base of mesofemur (29-36) of *Achilia*. (22, 29) *A. grandiceps*. (23, 30) *A. delamarei*. (24, 32) *A. jeanneli* n. sp. (25, 33) *A. franzi* n. sp. (26-27, 34) *A. elguetai* n. sp. (28, 35) *A. valdiviensis*. (31) *A. denticornis*. (36) *A. bicornis*.

73° 20'W; 06.XII.2013; car net. – PCPH; 2 ♂; Reserva Costera Valdiviana, Chaihuín; WDS-T-207; 39°58.6'S 73° 35'W; 27.II.2008; sifting litter; W. D. Shepard. – FMNH; 1 ♂; same data. – MHNG; 1 ♂; same data.

Description: Body 1.50-1.70 mm long; dark brown with reddish elytra, the latter generally darker at apex and along sutural stria, sometimes also at base; antennae and legs reddish; palpi yellowish. Head wider than long. Pronotum slightly wider than head and wider than long; disc moderately convex; median antebasal fovea slightly smaller than lateral ones; lateral margins with anterior portion distinctly convergent and sinuate anteriorly, and posterior portion slightly convergent and not sinuate. Elytra with discal stria extending to about elytral midlength. First abdominal tergite with slightly diverging basal striae extending to about one-third of paratergal length, and separated at base by more than one-third of tergal width.

Male: Head as in Figs 75-78, sub-triangular; frons slightly raised, its surface with some sparse big punctures at middle; two very big and deep vertexal foveae at center of frons at point even with center of eyes, at same distance from each other as from nearest eye; frontal sulcus lacking; frontal lobe pointed in middle, with thick tuft of straight yellowish bristles extended forwards; clypeus strongly prolonged forward, duck's beak-shaped. Eyes protruding, distinctly longer than short, with convex temples. Antennae (Figs 18-19) with scape longer than

wide, more (Fig. 19) or less (Fig. 18) elongated; pedicel misaligned, flattened and excavated on medial surface, as long as wide with mesal apical edge very pronounced (Fig. 18), or subrectangular in shape and distinctly longer than wide (Fig. 19); antennomere III slightly longer than wide; antennomere IV wider than long; antennomere V as long as wide; VI slightly wider than long; antennomere VII slightly longer than wide; antennomere VIII transverse; antennomere IX transverse with denticulate margins and protruding mesal margin; antennomere X wider than IX, wider than long with denticulate margin and protruding mesal margin; antennomere XI very elongate, also with denticulate margins, distinctly longer than VII-X combined, usually bearing long subbasal seta on mesal margin. Metaventrite with distal half covered by convergent long bristles, raised at middle for two-thirds of its distal portion, this surface entirely divided by median sulcus. Protrochanters (Fig. 28) with ventral margin formed as spine bearing one long basal seta; mesotrochanters (Fig. 35) with ventral margin forming long spine at basal third; mesofemora (Fig. 35) with basal third of ventral margin covered by broad, short and thick setae, those setae longer than in *A. grandiceps*. Protibiae (Fig. 39) enlarged for distal half, with medial margin forming small apical spine; mesotibiae (Fig. 43) with medial margin without recurved setae, apical margin forming two short spines. First abdominal sternite very long, projecting over second sternite which is thus almost entirely concealed. Aedeagus (Fig. 6) 0.29-0.31 mm



Figs 37-50. Male protibiae (37-39) and mesotibiae (40-50) of *Achilia*. (37, 49) *A. elguetai* n. sp. (38, 44) *A. denticornis*. (39) *A. vadiviensis*. (40-41) *A. grandiceps*, specimen from: (40) Llanquihue, Alerce Andino National Park, Laguna Triángulo; (41) Malleco, Purén, Contulmo Natural Monument. (42) *A. delamarei*. (43) *A. valdiviensis*. (45-46) *A. jeanneli* n. sp., specimen from: (45) Malleco, Nahuelbuta National Park, Piedra del Aquila, station 31b; (46) Malleco, Nahuelbuta National Park, Piedra del Aquila, station 10a. (47-48) *A. franzi* n. sp., specimen from: (47) Llanquihue, Alerce Andino National Park, Laguna Triángulo; (48) Osorno, Antillanca road. (50) *A. bicornis*.

long; with suboval dorsal plate, dorsal longitudinal struts slightly divergent. Parameres relatively wide with large and short seta on small outer lobe; tips rounded bearing large median seta. Copulatory pieces consisting of a pair of long wide medial sclerites basally recurved, sclerotized and apically rounded, with pair of thin lateral sclerites subequal in length, recurved, enlarged, sclerotized at base, with distal half thickly pitted near lateral margin.

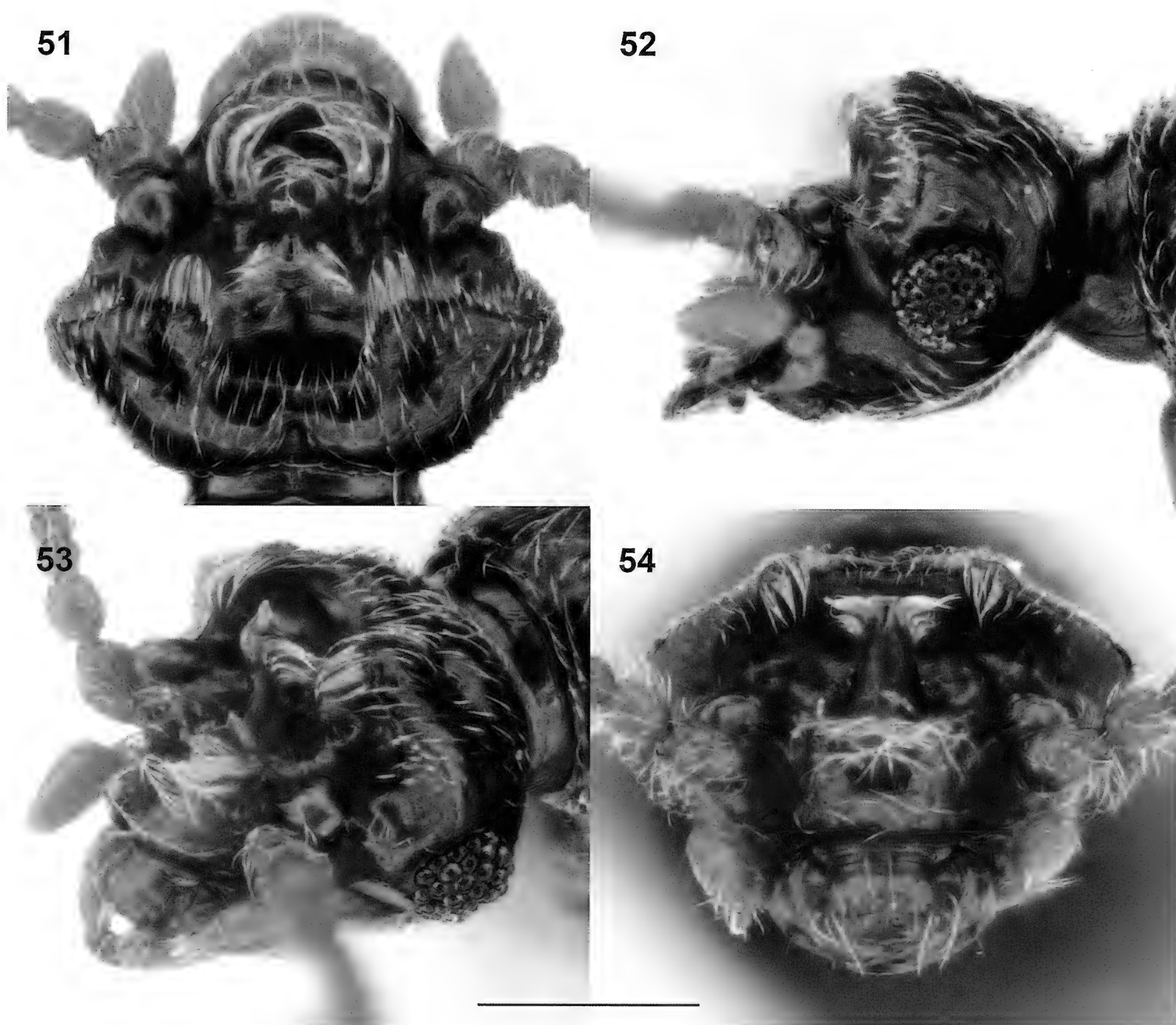
Female: Similar to male except eyes smaller and less protruding, frontal lobe barely pointed at middle and without tuft of setae, clypeus just slightly elongated, antennae with pedicel barely misaligned, subrectangular and not excavated. Metaventrite, abdominal sternites, and legs unmodified.

Collecting data: Collected from October to February in valdivian rainforests, presumably at low elevations. All specimens came from sifted samples of leaf and log litter, except for one male collected by car net.

Distribution: The species is known only from southern Chile (Fig. 84: green squares) from Chiloé and Valdivia provinces.

Comments: Blanchard described *Pselaphus valdiviensis* (1851: 563) based on an unspecified number of specimens from Valdivia. The description, very concise, did not report clear diagnostic characters such that subsequent authors (Reitter, 1885a; Schaufuss, 1886; and Raffray, 1895) thought this species was a member of the Tyrini.

Reitter (1883: 50) described *Bryaxis valdiviensis* (technically *valvidiensis* in the original description due to a *lapsus calami*) based on an unspecified number of specimens from Valdivia, without any mention of *Pselaphus valdiviensis*, and two years later he described (Reitter 1885a: 325 and 327) *Bryaxis nasuta* based on a single male specimen from Valdivia that had been collected by the cousins Elsbeth and Elfride Kindermann.



Figs 51-54. *Achilia grandiceps*. Male head in (51) dorsal, (52) lateral, (53) semilateral, and (54) frontal views. Scale bars (200 μ m).

In the same year Reitter (1885b: 317), realizing that the name *Bryaxis nasuta* was preoccupied, proposed to change the species name to *Bryaxis anas*. Later Reitter (1893: 261), apparently forgetting he already done so, proposed a second name for *Bryaxis nasuta*, but this time as *Bryaxis nasina*.

Raffray (1904: 138), having studied the type of *Pselaphus valdiviensis* Blanchard, 1851, which he believed to be in the MNHN collections, established that this species was not a member of the Tyrini, but should be transferred to *Achilia* in the Brachyglutini, and therefore proposed the substitute name *Achilia blanchardi* Raffray, 1904 for *Bryaxis valdiviensis* Reitter, 1883, and pointing out that *Bryaxis nasuta* Reitter, 1885 (= *Bryaxis nasina* Reitter, 1893) was identical to *Achilia valdiviensis* (Blanchard, 1851).

Then Jeannel (1962: 424-425) claimed that the types of

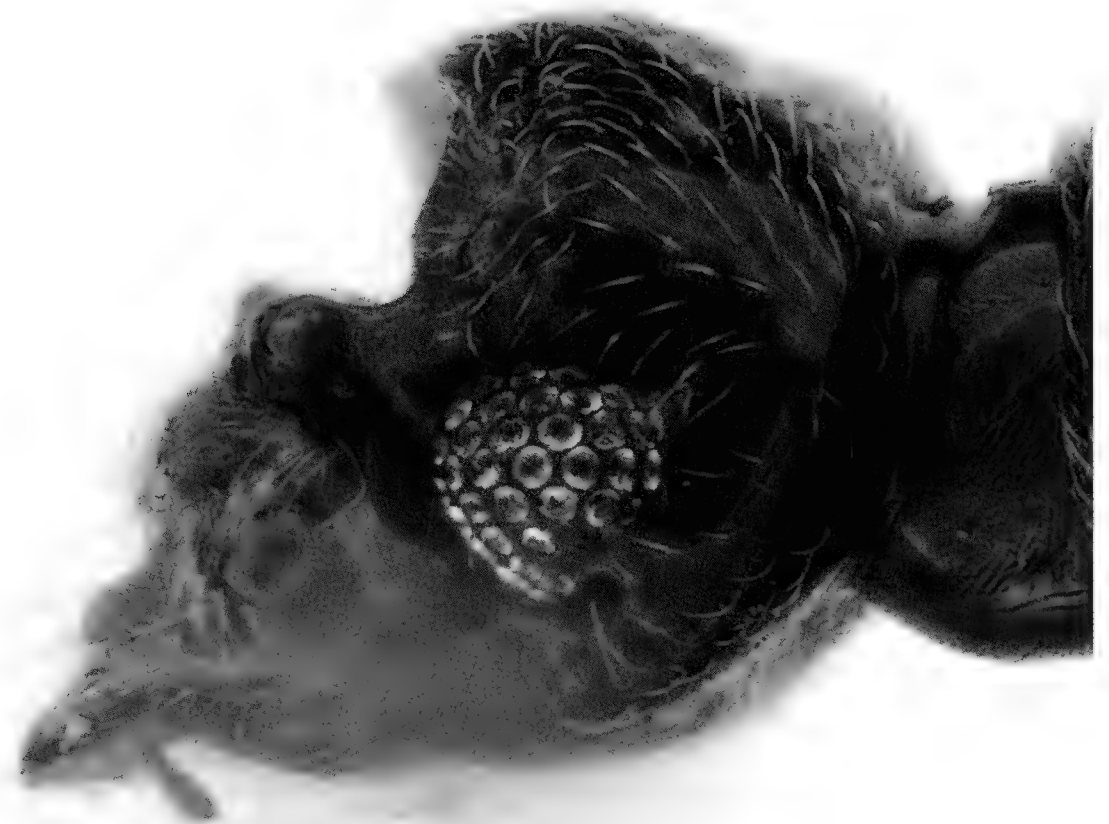
Bryaxis nasuta Reitter, 1885 and *Achilia valdiviensis* (Blanchard, 1851), both collected in Valdivia, were present in the MNHN collections, and among the material examined, he mentions only three specimens: Central Chile: Valdivia prov.: Env. of Valdivia (39 ° 50 'lat. S) male and female (Cl. Gay), and another male (E. and E. Kindermann).

However in MNHN we could find only 3 males of this species: 1 male in the Raffray collection labeled “Chili / Museum Paris, 1917, coll. Raffray / Type / *chilensis* Reitter / *A. valdiviensis*, A. Raffray det. / *valdiviensis* Bl. (handwritten by Jeannel)”, and 2 males in the general Chile collection – one labeled: “Museum Paris, Chili, Gay 1849 / H 49 / Valdivia / Gen. *Achilia* Reitt. =, *Bryaxis* Raffr., = *Pselaphus* Blanchard / *valdiviensis*; Blanch. = *nasina* Reitter, = *nasuta* Reitt., A. Raffray det. 1904 / *valdiviensis* Bl. (handwritten by Jeannel)”, and

55



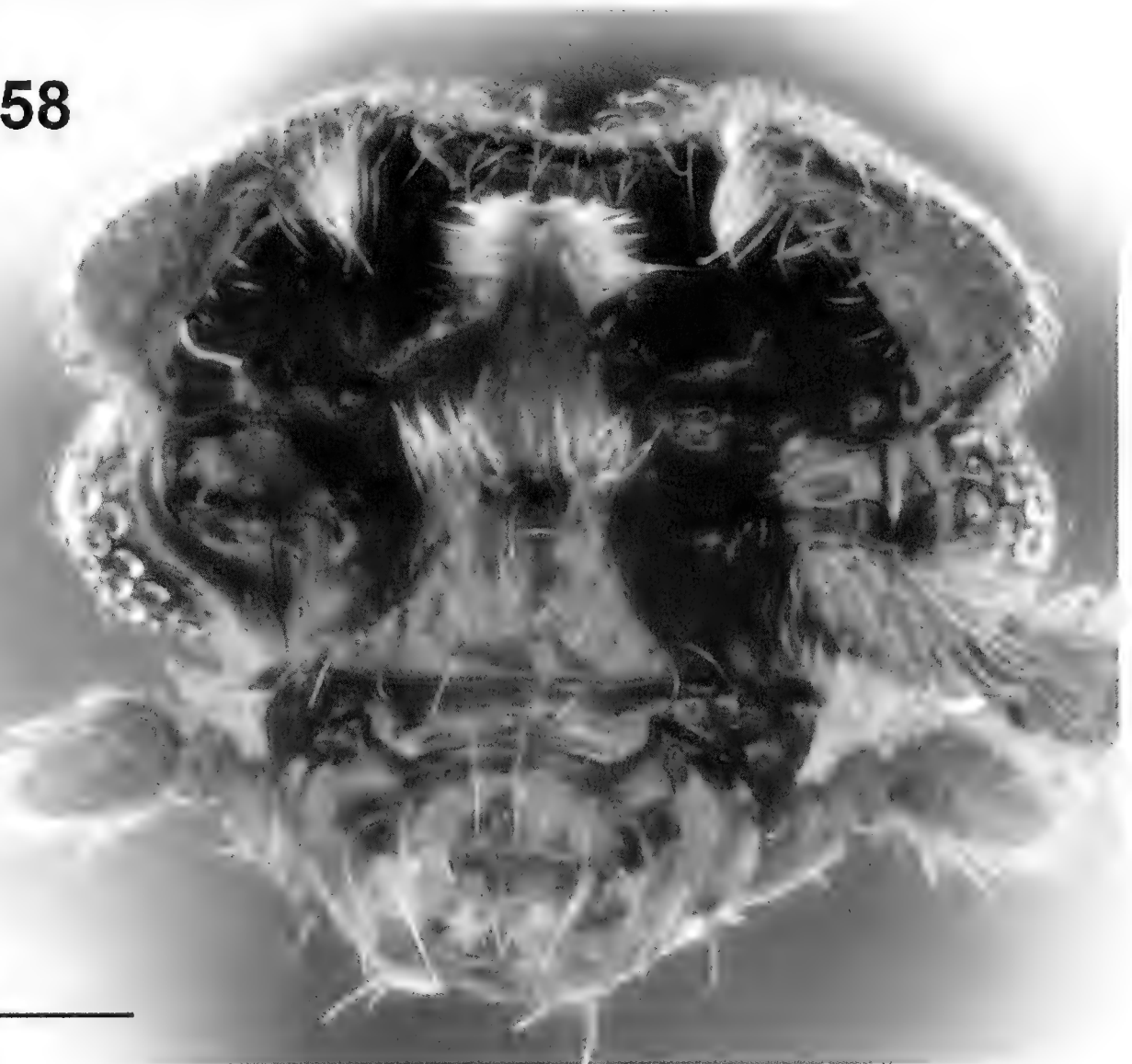
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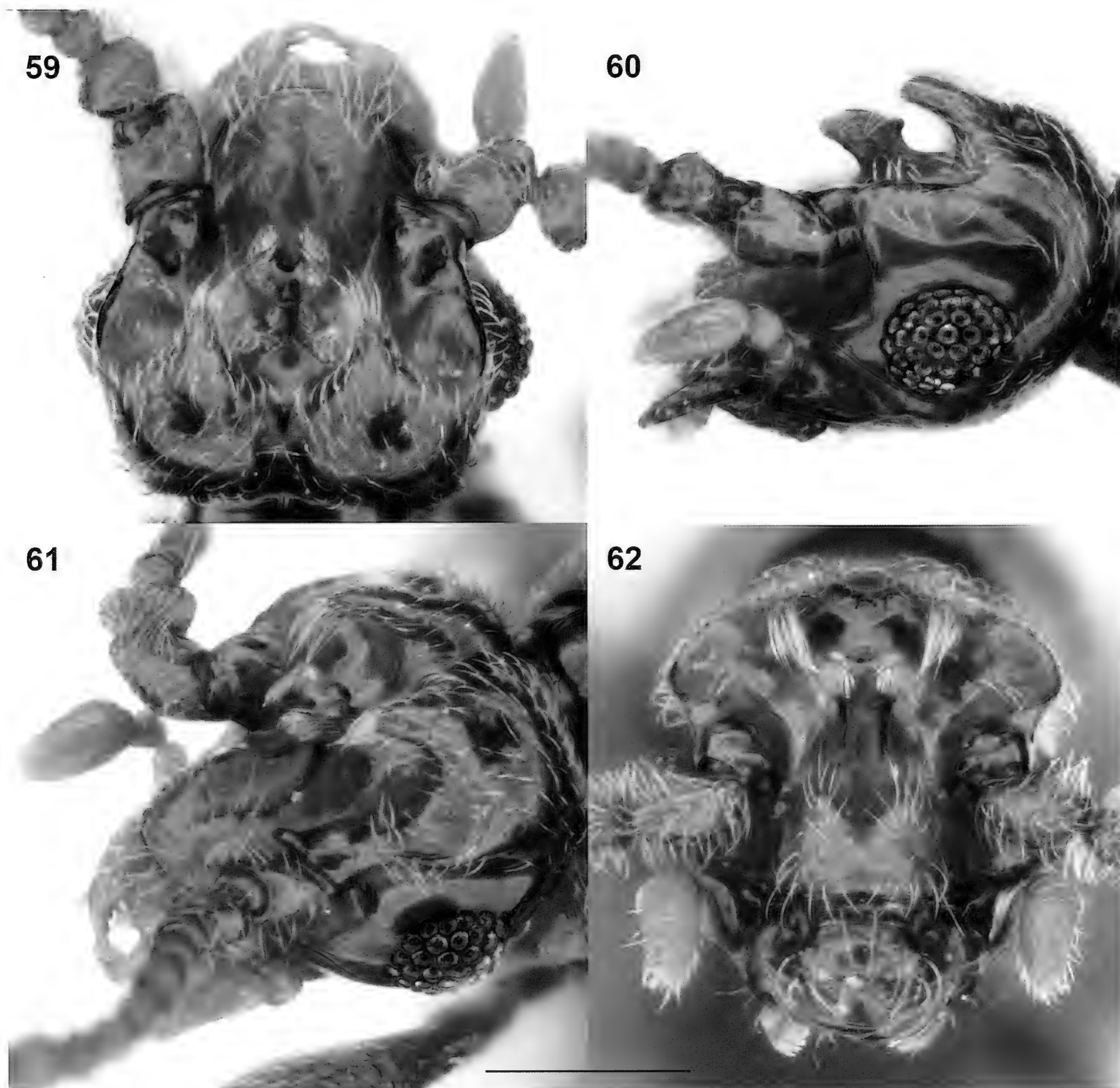
Figs 55-58. *Achilia delamarei*. Male head in (55) dorsal, (56) lateral, (57) semilateral, and (58) frontal views. Scale bar (200 µm).

the second labeled “Museum Paris, Chili, Gay 1849 / H 49/ Valdivia / *Achilia valdiviensis* Blch., A. Raffray det. 1904”. We think that these two males collected by Gay and studied by Raffray are part of the typical series of *Achilia valdiviensis* (Blanchard, 1851), and therefore designate them here as lectotype and paralectotype of *Achilia valdiviensis* (Blanchard, 1851). It is very likely that the male in the Raffray collection, which is labeled as the type of *A. valdiviensis* despite the handwritten label *chilensis* by Reitter, is the holotype of *Achilia nasuta* (Reitter, 1885) (= *A. nasina* Reitter, 1893).

We have also compared the types and other supplementary material of *A. kuscheli* Jeannel, 1962 with the types and other supplementary material of *A. valdiviensis*. The only

difference we could find between these two potential taxa is the morphology of the first two antennomeres (see Figs 18 and 19), but for all other characters, including the aedeagus, they are identical. Our opinion is that the different morphology of the first two antennomeres (scape and pedicel), although it has some geographical bearing, pertains to infraspecific variability and, we consequently decided that *Achilia kuscheli* Jeannel, 1962 must be considered a junior synonym of *Achilia valdiviensis* (Blanchard, 1851) (**syn. nov.**).

The males of this species are easily distinguished from their congeners by the peculiar morphology of the head (Figs 75-78) and antennae (Figs 18-19). The females (note here that we could examine only female specimens



Figs 59-62. *Achilia jeanneli* n. sp. Male head in (59) dorsal, (60) lateral, (61) semilateral, and (62) frontal views. Scale bar (200 μ m).

from Chiloe) are characterized by the subtriangular head with a prolonged clypeus and especially by the misaligned antennal pedicel, which is subrectangular and distinctly longer than wide.

***Achilia bicornis* species group**

Jeannel (1962: 398, 419) characterized this group as follows: elytra with 3 basal foveae; basal striae of first abdominal tergite separated about by a quarter of the tergal width; male frons with two occipital pubescent lobes protruding and separated by a large median furrow with a small median vertexal apophysis; frons anteriorly

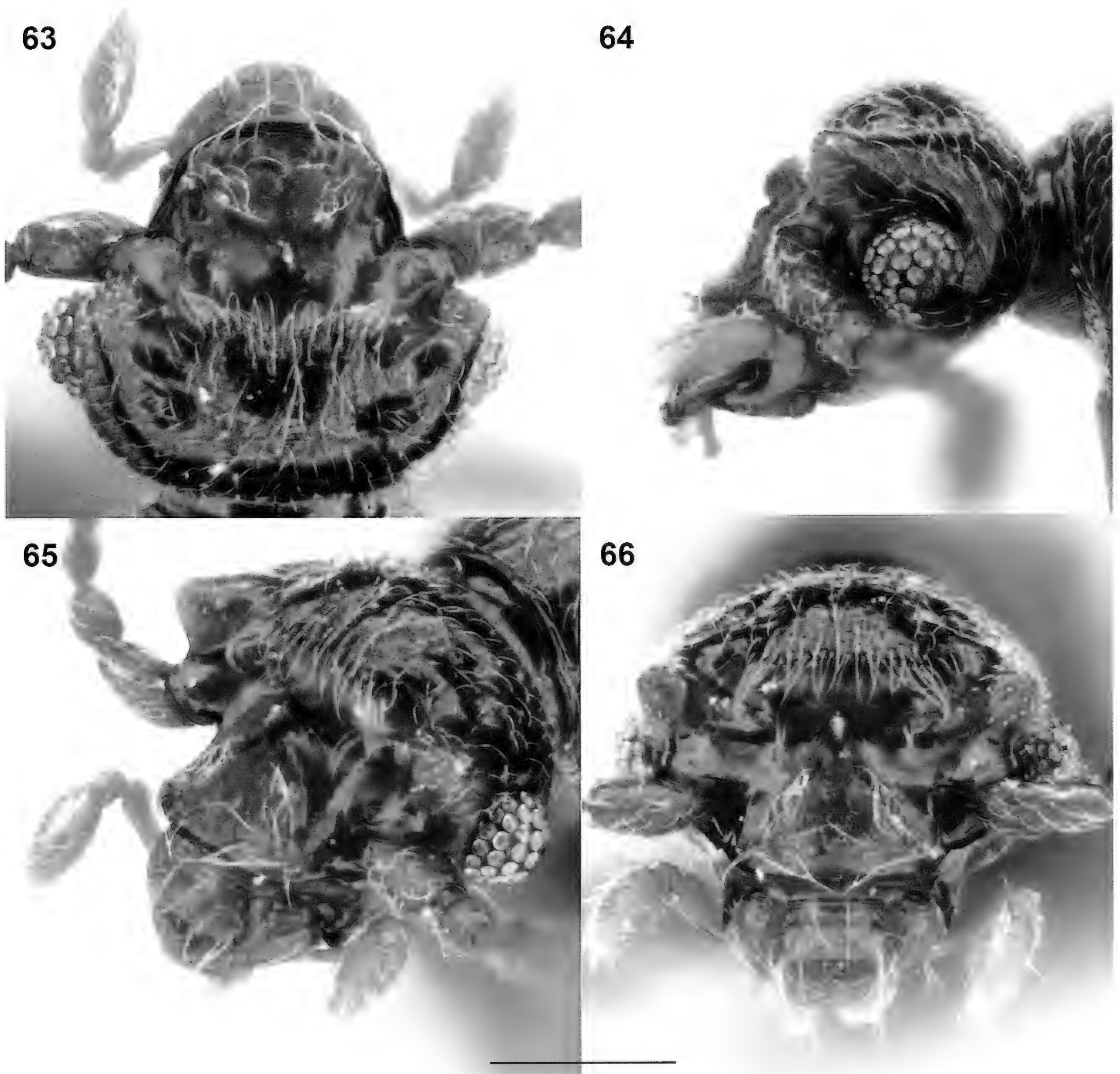
largely depressed as a smooth transverse groove; dorsal struts of aedeagus simple.

This group includes *A. bicornis* Jeannel, 1962 and *A. chilotides* Newton, 2017. However, our study of the type materials revealed that *A. chilotides* Newton, 2017 is a junior synonym of *A. excisa* (Schaufuss, 1880). Consequently the *A. bicornis* group now only holds *A. bicornis* Jeannel, 1962.

***Achilia bicornis* Jeannel, 1962**

Figs 9-11, 20-21, 36, 50, 79-82, 84

Achilia bicornis Jeannel, 1962: 419, figs 179 (head), 180 (aedeagus).



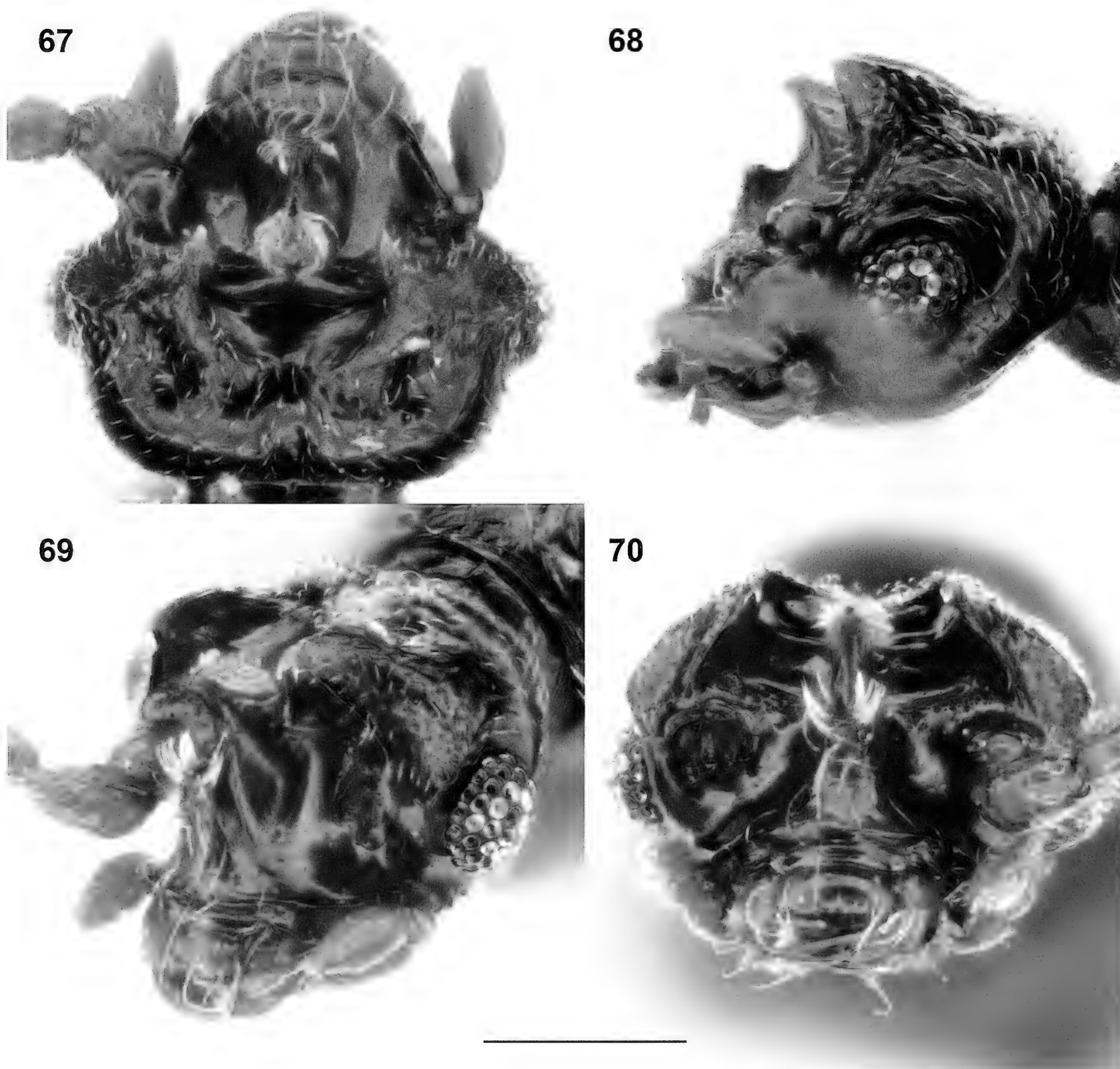
Figs 63-66. *Achilia franzi* n. sp. Male head in (63) dorsal, (64) lateral, (65) semilateral, and (66) frontal views. Scale bar (200 µm).

Achilia simpsoni Franz, 1996: 121, fig. 73 (aedeagus) (**syn. nov.**).

Type material (42 ex.): SOUTHERN CHILE: Región Los Lagos: Chiloé prov.: MHNS; 1 ♂ (holotype); labels verbatim "Type / Chepu, 02.X.1958, G. Kuschel / *Achillia bicornis* / *bicornis* (handwritten by Jeannel) / CHILE, M.N.H.N., Typo, n. 1802". – MNHN; 4 ♂ and 5 ♀ (paratypes); labels verbatim "Paratype / Chepu, 02.X.1958, G. Kuschel / *A. bicornis* (handwritten by Jeannel)". – MNHN; 2 ♂ and 8 ♀ (paratypes); labels verbatim "Paratype / Chepu, 04.X.1958, G. Kuschel". – MNHN; 2 ♀ (paratypes); labels verbatim "Paratype / Chepu, 13.X.1958, G. Kuschel". – MNHN; 2 ♀ (paratypes); labels verbatim "Paratype / Chepu, 15.X.1958, G. Kuschel". – MNHN; 1 ♂

and 8 ♀ (paratypes); labels verbatim "Paratype / Chepu, 16.X.1958, G. Kuschel". – MNHN; 1 ♂ and 3 ♀ (paratypes); labels verbatim "Paratype / Chepu, 17.X.1958, G. Kuschel". – Región Aysén: Coyhaique prov.: NHMW; 1 ♂ (holotype of *A. simpsoni*); labels verbatim "Rio Simpson Natural Park, H. Franz / Holotype / *Achilia simpsoni* (handwritten by Franz)". – NHMW; 1 ♂ and 3 ♀ (paratypes of *A. simpsoni*); labels verbatim "Rio Simpson Natural Park, H. Franz / Paratype / *Achilia simpsoni* (handwritten by Franz)".

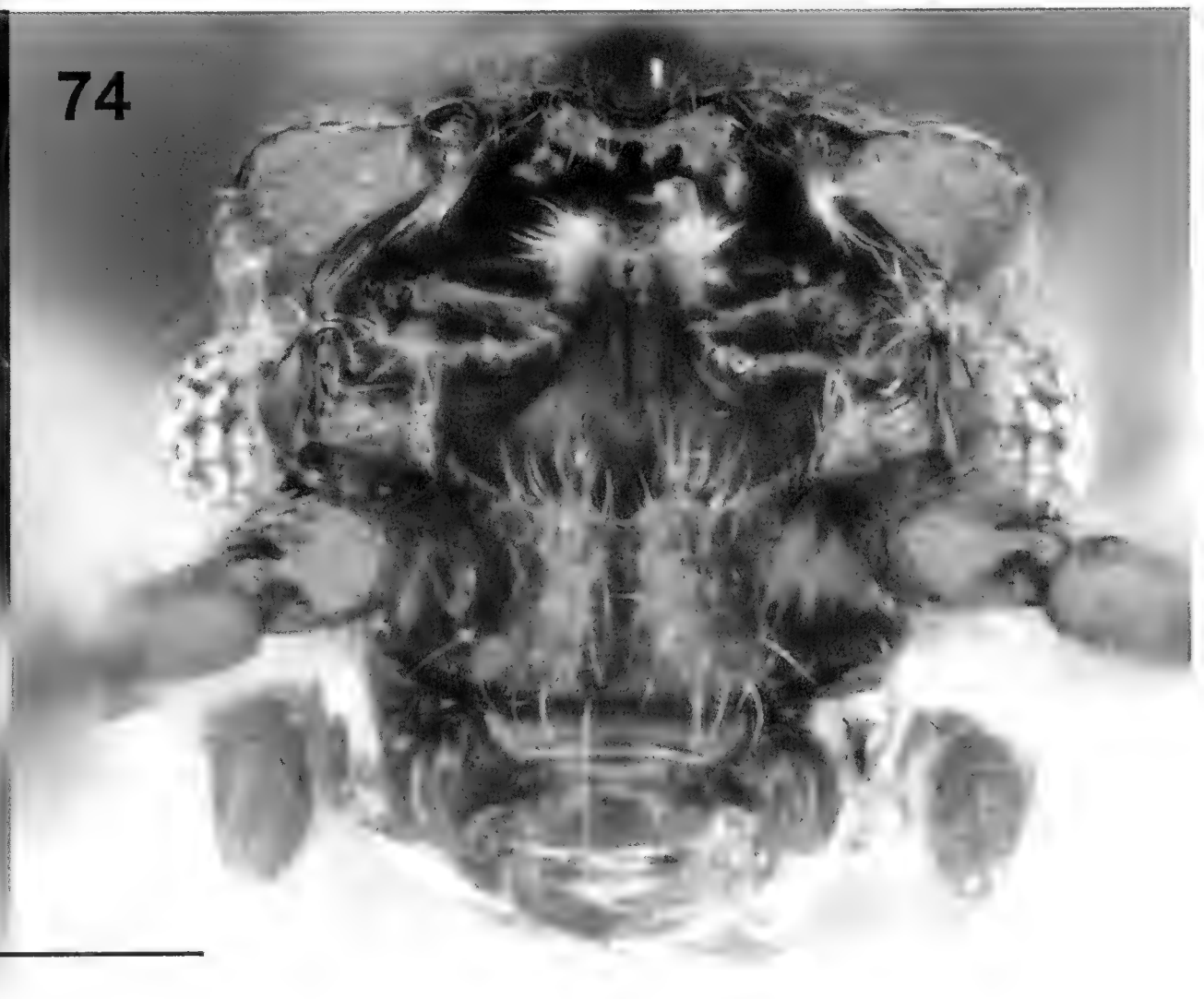
Additional material examined (1514 ex.): SOUTHERN AND CENTRAL CHILE: – Región Aysén: Aysén prov.: NHMW; 23 ♂ and 38 ♀; Rio Simpson National Park; H. Franz. – MHNG; 1 ♂; same data. – FMNH (FMHD #85-953, #85-70); 1 ♂; 15 km S



Figs 67-70. *Achilia elguetai* n. sp. Male head in (67) dorsal, (68) lateral, (69) semilateral, and (70) frontal views. Scale bar (200 µm).

Las Juntas, 30 km N Puyuhuapi; 30.XII.1984/29.I.1985; FIT *Nothofagus* forest; S. & J. Peck. – MHNG; 9 ♂ and 5 ♀; same data. – MHNG; 4 ♂ and 16 ♀; 30 km N Puyuhuapi; 100 m; 29.I.1985; site 107, sifted moss on logs; S. & J. Peck. – MHNG; 21 ♂ and 33 ♀; 34 km W Puerto Aysén, San Sebastian; 150 m; 24.I.1985; site 103, cliff base, mixed forest and bamboo litter; S. & J. Peck. – FMNH (FMHD #85-986, #85-103); 6 ♂ and 2 ♀; same data. – FMNH (FMHD #85-988, #85-105); 2 ♂; 33 km E Puerto Aysén, Rio Simpson National Park; 70 m; 26.I.1985; forest sifted leaf and stick litter; S. & J. Peck. – MHNG; 28 ♂ and 35 ♀; same data, but 26.I.1985; forest sifted moss on stumps. – MHNG; 5 ♀; Puerto Chacabuco; 18.VIII.1976; T. Cekalovic. – MHNG; 1 ♂ and 3 ♀; Cisnes Media; 06.II.1983; T. Cekalovic. – MHNG; 2 ♂; Cisnes to Las Juntas; 30. XII.1984; forest and pasture, car netting; S. & J. Peck. –

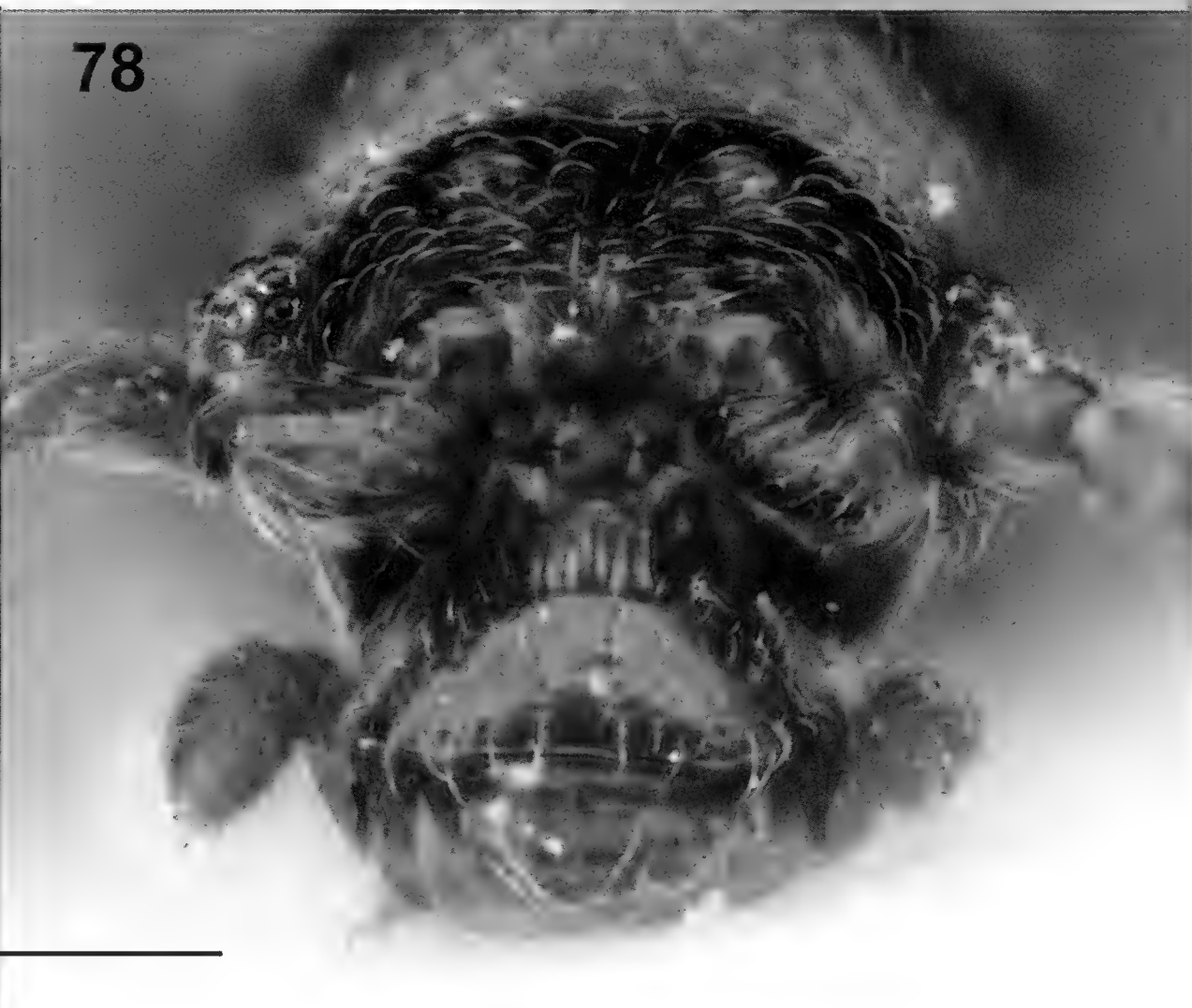
MHNG; 1 ♂; 16 km NW Cisnes Medio, Río Grande; 200 m; 30.XII.1984-28.I.1985; mature beech forest, FIT; S. & J. Peck. – Coyhaique prov.: NHMW; 1 ♂; Umg. Coyhaique; H. Franz. – MHNG; 1 ♂; 10 km N of Coyhaique, National Reserve; 900 m; 23.I.1985; beech forest, mossy, log & leaf litter; S. & J. Peck. – Región Los Lagos: Palena prov.: FMNH (FMHD #85-65, #85-65); 2 ♂; 37 km SE Chaitén; 60 m; 28.XII.1984/30.I.1985; riverside 2nd forest, FIT; S. & J. Peck. – MHNG; 21 ♂; same data. – FMNH (FMHD #85-991, #85-108); 2 ♂ and 3 ♀; 4 km NW Chaitén; 10 m; 30.I.1985; mixed forest litter, sooty fungus, berlese, S. & J. Peck. – MHNG; 9 ♂ and 20 ♀; same data; site 108; S. & J. Peck. – FMNH (FMHD #97-34); 2 ♂; Austral Highway km 89.5 (12.3 km W Homopirén); 41°59.10'S 72° 34.12'W; 10 m; 24.I.1997; site 1004, low secondary valdivian rainforest, berlese,



Figs 71-74. *Achilia denticornis*. Male head in (71) dorsal, (72) lateral, (73) semilateral, and (74) frontal views. Scale bar (200 µm).

leaf & log litter; A. Newton & M. Thayer. – Chiloé prov.: MHNS; 2 ♀ (mislabelled as paratypes of *A. bicornis* n. 1803-1804); Chepu; 02.X.1958; G. Kuschel. – MHNS; 3 ♂ and 7 ♀ (mislabelled as paratypes of *A. bicornis* n. 1805-1814); same data, but 04.X.1958. – MHNS; 2 ♂ and 1 ♀ (mislabelled as paratypes of *A. bicornis* n. 1816-1818); same data, but 16.X.1958. – MHNS; 4 ♀ (mislabelled as paratypes of *A. bicornis* n. 1819-1822); same data, but 11.X.1958. – MHNS; 1 ♂ (mislabelled as paratype of *A. bicornis* n. 1823); same data, but 16.X.1958. – MSNG; 1 ♀; Chepu; 19.II.1991; site TC-275; T. Cekalovic. – MSNG; 1 ♂ and 2 ♀; same data, but 09.II.1999; site TC-580. – MSNG; 1 ♂; same data, but 26.I.2000; site TC-625. – MSNG; 1 ♀; same data, but 20.I.2000; site TC-610. – NHMW; 2 ♂ and 1 ♀; Chiloé; H. Franz. – MSNG; 4 ♂ and 1 ♀; Isla Quinchao; Quetro; 20.I.1998;

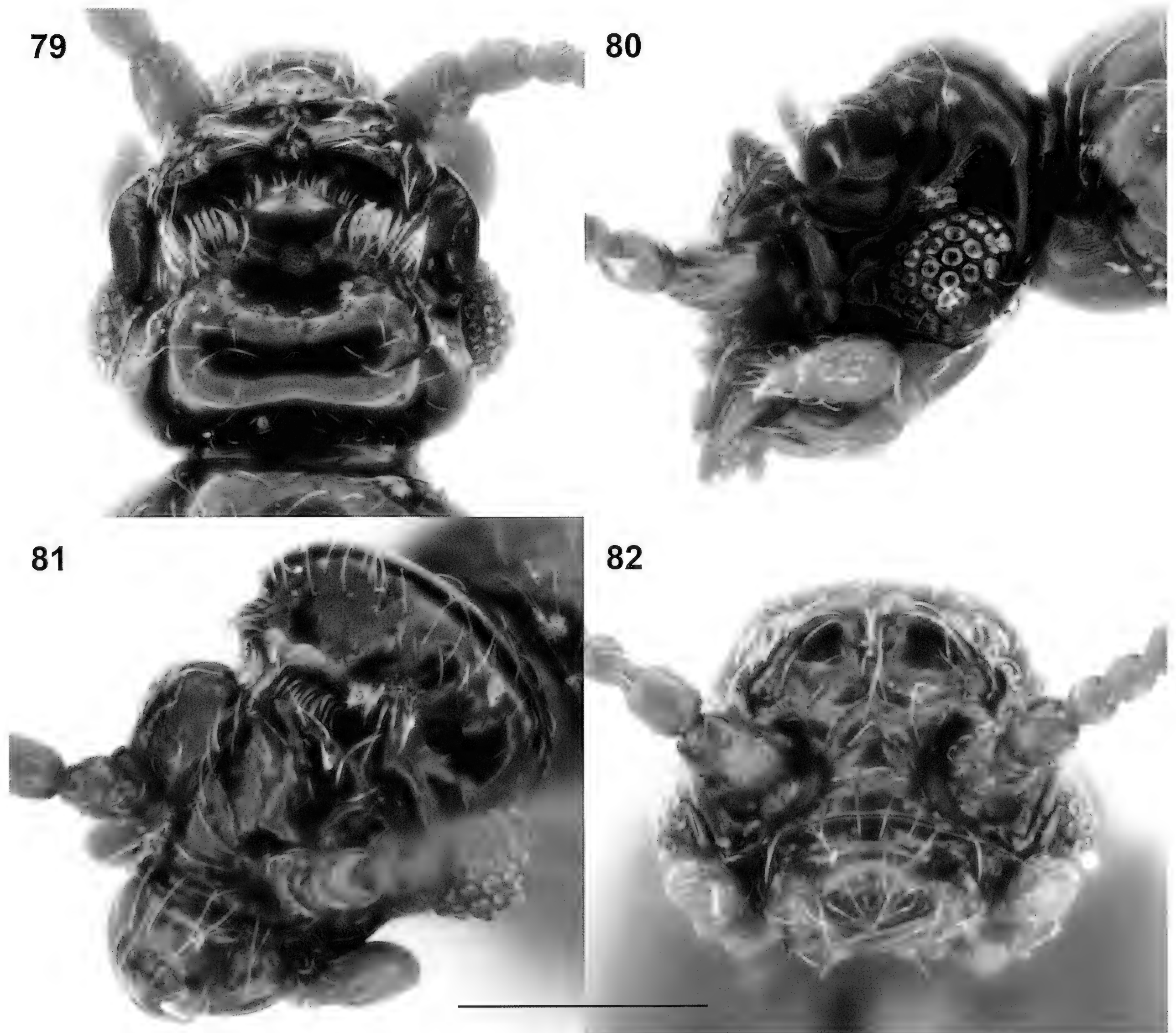
T. Cekalovic. – MSNG; 1 ♂; same data, but 12.II.1999; TC-582. – PHPC; 5 ♂ and 2 ♀; Chiloé Island, Cucao; WDS-T-209; 42° 35'S 74° 05'W; 02.III.2008; litter sifting; W. D. Shepard. – NHMW; 1 ♂ and 3 ♀; Chiloé, San Juan de Chadmo; H. Franz. – MSNG; 21 ♂; same locality, but 18.I.1998; site TC-555; T. Cekalovic. – MSNG; 1 ♂ and 1 ♀; Estero Llicaldad; 19.I.2000; site TC-608; T. Cekalovic. – MHNG; 20 ♂ and 49 ♀; Isla Chiloé, Mocopulli; 2.II.1983; T. Cekalovic. – MHNG; 1 ♂ and 1 ♀; Isla Chiloé, Piruquina; 19.II.1983; T. Cekalovic. – MHNG; 1 ♂; same data, but 26.II.1976. – MHNG; 1 ♀; Isla Chiloé, Vilupulli; 26.II.1976; T. Cekalovic. – MSNG; 2 ♂ and 1 ♀; 5 km SW Chonchi, 21.I.1998; site TC-560; T. Cekalovic. – MSNG; 2 ♂ and 1 ♀; same locality; 14.I.1999; T. Cekalovic. – FNHH (FMHD #97-25); 1 ♂; Miraflores, road to (0.6 km W Hwy 5); 42°46.73'S



Figs 75-78. *Achilia valdiviensis*. Male head in (75) dorsal, (76) lateral, (77) semilateral, and (78) frontal views. Scale bar (200 µm).

73°47.71'W; 130 m; 17.I.1997; site 994, secondary valdivian rainforest, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-22); 1 ♂ and 2 ♀; SE edge of Tepuhueico; 42° 48.11'S 73° 55.36'W; 50 m; 15.I.1997; site 992, valdivian rainforest, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-24); 7 ♂ and 10 ♀; Colonia Yungay road (3.6 km W Hwy 5); 42° 59'S 73° 41'W; 90 m; 17.I.1997; site 995, grazed secondary valdivian rainforest remnants, berlese, leaf & log litter; A. Newton & M. Thayer. – Llanquihue prov.: MHNS; 4 ♂ and 9 ♀ (mislabelled as paratypes of *A. bicornis* n. 1829-1838 and 2040-2042); Los Riscos; 11.IV.1954; G. Kuschel. – MNHN; 3 ♂ and 14 ♀; same data. – MNHN; 4 ♀; Frutillar; 20.IX.1957; G. Kuschel. – MNHN; 1 ♂; same data, but 25.IX.1957. – UNHC; 1 ♂; Lago Chapo, 13.5 km E Correntoso; 310 m; 16-27.XII.1982; site 656,

valdivian rainforest, flight intercept (windows) trap; A. Newton & M. Thayer. – FMNH; 2 ♂; same data. – FMNH (FMHD #97-16); 12 ♂ and 7 ♀; Lago Chapo, near SE end, km 9.9 on road from Rollizo; 41° 30.63'S 72° 23.98'W; 385 m; 04.I.1997; site 989, valdivian rainforest on steep slope, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-26); 5 ♂ and 6 ♀; Lago Chapo, 1.2 km N of NW end; 41° 25'S 72° 35'W; 265 m; 19.I.1997; site 996, small secondary *Nothofagus dombeyi* w/valdivian rainforest understory, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-27); 2 ♂; 5.4 km N Correntoso, 1 km SW Rio Blanco Bridge; 41° 24'S 72° 38'W; 325 m; 19.I.1997; site 997, secondary valdivian rainforest in damp ravine, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #97-37); 1 ♀; Vicente Perez Rosales National Park, SW slope



Figs 79-82. *A. bicornis*. Male head in (79) dorsal, (80) lateral, (81) semilateral, and (82) frontal views. Scale bar (200 µm).

Osorno Volcan, km 6 to La Burbuja; 41° 09.08'S 72° 30.15'W; 925 m; 27.I.1997; site 1006, low *Nothofagus dombeyi* on lava w/shrubby understory, berlese, litter under leaves, mosses & lichens; A. Newton & M. Thayer. – PCTS; 2 ♂; Lenca, 41° 58'S 72° 57'W; 18.XII.2013; layer litter. – Osorno prov.: NHMW; 2 ♂ and 2 ♀ (1 ♀ sub *A. denticornis*); Puyehue National Park, Osorno; H. Franz. – NHMW; 6 ♂ and 18 ♀ (2 ♂ and 9 ♀ sub *A. testacea*; 4 ♂ and 8 ♀ sub *A. monstrata* and 1 ♀ sub *A. denticornis*); Umg. Osorno; H. Franz. – MHNG; 1 ♂; same locality. – MHNG; 2 ♂ and 7 ♀; Puyehue; 05.II.1979; A. de Chambrier. – MHNG; 3 ♂ and 3 ♀; Pucatrihue, 65 km W Osorno; 40° 28'S 73° 43'W; 150 m; 04.XII.1984; site 21, valdivian rainforest, sifting of moss on dead tree trunks, branches and rocks and of vegetable detritus; D. Burckhardt. – PHPC; 16 ♂ and 44 ♀; Puyehue National Park, 26.2 km E Entre Lagos, near Termas Aguas Calientes; 460 m; 40° 44.130'S 72° 18.427'W; 09-12.III.2008; sifting litter; H. Wood & C. Griswold. – UNHC; 2 ♂; Puyehue National Park, Aguas Calientes; 440 m; 17-26.XII.1982; valdivian rainforest, at UV light; A. Newton & M. Thayer. – FMNH; 2 ♂; same data. – MHNG; 18 ♂ and 52 ♀; Puyehue National Park, Aguas Calientes; 400-500 m; 31.XII.1990/1.I.1991; site 25a, sifting of vegetational and alluvial debris, and moss; D. Agosti & D. Burckhardt. – MHNG; 9 ♂ and 3 ♀; Puyehue National Park, Aguas Calientes; 40° 40'S 72° 20'W; 450-600 m; 01-03.XII.1992; site 20b, sifting of moss on dead tree trunks, branches and rocks and vegetational debris; D. Burckhardt. – PCTS; 4 ♂; Aguas Calientes, 40° 74'S 72° 30'W; 13.XII.2013; car net. – PCTS; 22 ♂ and 12 ♀; Aguas Calientes, 40° 74'S 72° 27'W; 14. XII.2013; litter layer. – FMNH (FMHD #85-928, #85-43); 1 ♂ and 2 ♀; Puyehue National Park, Aguas Calientes; 500 m; 20.XII.1984; forest litter on trail, sifting; S. & J. Peck. – MHNG; 4 ♂ and 29 ♀; same data, but Pionero trail; sifted forest stick litter. – MHNG; 1 ♂ and 1 ♀; same data, but 20.XII.1984-08. II.1985; FIT derumbes forest trail, sifting. – UNHC; 2 ♂ and 2 ♀; Puyehue National Park, 4.1 km E Anticura; 430 m; 19-26.XII.1982; trap site 662, valdivian rainforest; A. Newton & M. Thayer. – FMNH; 3 ♂ and 1 ♀; same data. – FMNH; 7 ♂ and 32 ♀; same data, but berlese, leaf & log litter, forest floor; vouchers associated with larvae. – FMNH; 2 ♂ and 7 ♀; same data, but window trap 662. – FMNH (FMHD# 97-5); 1 ♂ and 6 ♀; Puyehue National Park, 4 km E Anticura; 40° 39.73'S 72° 08.10'W; 460 m; 30.I.1997; site 985-3, valdivian rainforest w/large *Saxegothea*, flight intercept trap; A. Newton & M. Thayer. – FMNH (FMHD# 97-39); 27 ♂ and 50 ♀; same data, but site 985-3, berlese, leaf & log litter. – FMNH (FMHD# 97-41); 5 ♂ and 8 ♀; same data, but site 985-1. – FMNH (FMHD# 96-250); 12 ♂ and 3 ♀; same data, but 30. XII.1996/30.I.1997; site 985-1, valdivian rainforest w/ large *Saxegothea*, flight intercept trap. – FMNH

(FMHD# 97-4); 1 ♂; same data, but 01-30.I.1997; site 985-2 valdivian rainforest w/large *Saxegothea*, flight intercept trap. – FMNH (FMHD# 97-4); 7 ♂ and 7 ♀; same data, but site 985-2, berlese, leaf & log litter. – FMNH (FMHD #85-925, #85-40); 1 ♂; Puyehue National Park, S of Anticura; 500 m; 19.XII.1984/06. II.1985; mixed forest along river, carrion trap; S. & J. Peck. – FMNH (FMHD #85-996, #85-113); 1 ♂ and 2 ♀; Puyehue National Park, Anticura Repucura trail; 500 m; 06.II.1985; forest litter; S. & J. Peck. – MHNG; 20 ♂ and 61 ♀; same data. – MHNG; 2 ♂; same data, but 500 m; 19.XII.1984; site 41, bracket fungi with soft fungi. – UNHC; 1 ♂; Puyehue National Park, Antillanca road; 470 m; 20-25.XII.1982; valdivian rainforest, berlese, leaf & log litter, forest floor; A. Newton & M. Thayer. – FMNH; 11 ♂ and 46 ♀; same data. – UNHC; 1 ♂; same data, but 470-720 m; 18-24. XII.1982; valdivian rainforest, screen sweeping at dusk. – FMNH; 1 ♂; same data. – FMNH (FMHD #85-923, #85-38); 1 ♂; same data, but 500-1000 m; 18-20. XII.1984; car netting; S. & J. Peck. – MHNG; 13 ♂; same data. – FMNH (FMHD #96-244); 1 ♂; Puyehue National Park, Antillanca road, 7.2 km above Aguas Calientes; 40° 45.55'S 72° 17.82'W; 660 m; 29. XII.1996/01.II.1997; site 982, valdivian rainforest w/ *Saxegothea* dominant, dense *Chusquea*, flight intercept trap; A. Newton & M. Thayer. – UNHC; 1 ♂; Hills S of Maicolpué; 160 m; 21.XII.1982; 2nd valdivian forest, berlese, leaf & log litter, forest floor; A. Newton & M. Thayer. – FMNH; 1 ♂ and 5 ♀; same data. – FMNH (FMHD# 96-247); 4 ♂ and 23 ♀; Hills S of Maicolpué; 40° 36.57'S 73° 44.91'W; 160 m; 30.XII.1996; site 983, disturbed valdivian rainforest, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #85-933, #85-48); 1 ♀; 3 km S Maicolpué, Bahía Mansa; 200 m; 03.II.1985; mixed forest litter; S. & J. Peck. – MHNG; 7 ♀; same data. – MHNG; 28 ♂ and 162 ♀; same data, but 21.XII.1984; mixed forest litter; S. & J. Peck. – FMNH; 1 ♂; Chincay, 10 km E of Bahía Mansa; 50 m; 21.XII.1982; 2nd valdivian forest, berlese, leaf & log litter, forest floor; A. Newton & M. Thayer. – MSNG; 4 ♂ and 4 ♀; Los Ñilques, 13.I.1990; site TC-260; T. Cekalovic. – MSNG; 1 ♀; same data, but 17.I.1998; site TC-553. – PCVB; 3 ♂ and 1 ♀; same data, but 13.I.1990; site TC-262. – FMNH (FMHD #96-248); 1 ♂; 15.1 km W Puaicho; 40° 34.97'S 73° 37.68'W; 50 m; 30.XII.1996; site 984, valdivian rainforest remnant in sm. ravine, w/large ferns, berlese, leaf & log litter; A. Newton & M. Thayer. – FMNH (FMHD #2002-90); 9 ♂ and 27 ♀; Puyehue National Park, Ruta 215; km 4.5 of Aduana station; 40° 40.23'S 72° 05.21'W; 580 m; 19.XII.2002; site 1071, valdivian rainforest, berlese, leaf & log litter; A. Newton, M. Thayer, D. J. Clarke & M. Chani. – FMNH (FMHD #2002-083); 2 ♀; Vicente Perez Rosales National Park, SW slope Volcán Osorno, road to Ref. La Picada; 41° 01.05'S 72° 32.90'W; 430 m; 16.XII.2002; site 1068,



Fig. 83. Distribution map of *Achilia grandiceps* group. (◆ green diamonds) *A. grandiceps*. (■ red squares) *A. delamarei*. (▲ blue triangles) *A. denticornis*. (★ fuchsia stars) *A. jeanneli* n. sp. (◻ squares edged in fuchsia) *A. franzi* n. sp. (▼ red inverted triangles) *A. elguetai* n. sp.



Fig. 84. Distribution map of *Achilia bicornis* and *valdiviensis* group. (● red circles) *A. bicornis*. (■ green squares) *A. valdiviensis*.

Nothofagus dombeyi w/conifers, berlese, leaf & log litter; A. Newton, A. Solodovnikov & M. Chani. – PCVB; 2 ♂ and 6 ♀; Puente Pescadero, 17.I.1988; site TC-191; T. Cekalovic. – Región Los Ríos: Ranco prov.: MHNG; 1 ♂ and 1 ♀; 34 km WNW La Unión, station 36; 700 m; 17.XII.1984; litter mixed evergreen forest; S. & J. Peck. – PCTS; 1 ♂; road to Alerce Costero National Park, 40° 20'S 73° 43'W; 07.XII.2013; car net. – PCTS; 1 ♂; Alerce Costero National Park, 40° 17'S 73° 47'W; 09.XII.2013; layer litter. – Valdivia prov.: NHMW; 3 ♂ and 5 ♀ (all sub *A. caracolana* unless 1 ♀ sub *A. denticornis*); Cordillera de la Costa, Mehuín; H. Franz. – NHMW; 8 ♂ and 10 ♀; same data. – MHNG; 1 ♂ and 3 ♀; Parque Nacional Alerce Costero, Chaihuín; 500 m; 15.II.2018; sifting litter; G. Sabella & D. Mifsud. – MHNG; 2 ♀; same data, but 350 m; 16.II.2018; sifting litter. – MHNG; 3 ♂ and 2 ♀; same locality, but 0-100 m; 15.II.2018; forest litter; S. Kurbatov. – JEBC; 1 ♂; Valdivia, Oncol Park, Casa visitas; 473 m; 39° 42.303'S 73° 18.704'W; 07.I.2007; fogging s/ *Nothofagus pumilio*; J.E. Barriga-Tuñón. – PCPH; 4 ♀; Oncol Park, 12 km NW Valdivia, Sendero Bonifacio; WDS-T-201; 39° 42'S 73° 19'W; 22.II.2008; sifting litter; W. D. Shepard. – Región Araucanía: Cautín prov.: MHNG; 5 ♂ and 24 ♀; Huerquehue National Park; 800-900 m; 22-24.XII.1990; site 16a, sifting of vegetational debris and moss; D. Agosti & D. Burckhardt. – MHNG; 1 ♀; 15 km NE Villarrica, Flor del Lago; 500 m; 10.II.1985; log spraying; S. & J. Peck. – PCTS; 6 ♂; Palguin, 39° 43'S 71° 79'W; 05.XII.2013; layer litter. – Malleco prov.: MHNG; 1 ♂; Purén, Contulmo Natural Monument; 350 m; 11.XII.1984-13.II.1985; S. & J. Peck 85-16. – Región Bio-Bio: Concepción prov.: NHMW; 1 ♂; Periquillo; 29.X.1992. – MHNG; 2 ♂ and 13 ♀; Pinares; 18.III.1973; T. Cekalovic.

Description: Body 1.50-1.60 mm long, dark brown with elytra reddish, reddish-brown or sometimes brown, or sometimes entirely brown with darker head; antennae and legs reddish; palpi yellowish. Head wider than long. Pronotum wider than head and wider than long; disc moderately convex; median antebasal fovea slightly smaller than lateral ones; lateral margins with anterior portion distinctly convergent and sinuate anteriorly, posterior portion slightly convergent and not sinuate. Discal elytral stria extending to about elytral midlength. First abdominal tergite with slightly diverging basal striae extending to about one-third of paratergal length, separated at base by about one-third of tergal width.

Male: Head as in Figs 79-82, with occipital region and posterior portion of frons raised, forming two protuberances that are densely pubescent apically and separated by deep U-shaped median depression; frons with deep and wide transverse furrow crossing at point even with anterior margin of eyes by; lateral margins of furrow posteriorly forming medial apophysis

projecting upwards and apically pubescent, anteriorly at middle slightly deflected with gibbosity that is longitudinally oblique, flattened with shiny frontal lobe. Eyes protruding, distinctly longer than convex temples. Antennae (Figs 20-21) quite variable in shape; scape longer than wide, less (Fig. 20) or more (Fig. 21) elongate; pedicel as long as wide (Fig. 20) or longer than wide (Fig. 21); antennomere III about as long as wide; antennomeres IV-V slightly wider than long (Fig. 20), or distinctly transverse (Fig. 21); antennomeres VI-VIII slightly wider than long; antennomeres IX-X wider than long, with denticulate margins and lateral margins protruding; antennomere XI elongate, with denticulate margins, and longer than VII-X combined. Metaventrite deeply excavated on about two-thirds of its surface by large ovoid depression. Mesotrochanters (Fig. 36) with ventral margin bearing long bristle at middle; mesotibiae (Fig. 50) with subapical spur on medial margin, distal half bulging and densely pubescent. First abdominal sternite with slight inverted V-shaped medial depression; following sternites slightly flattened at middle. Aedeagus (Figs 9-11) 0.37-0.38 mm long; with ovoidal dorsal plate, dorsal longitudinal struts divergent. Parameres very wide with very large and long seta on well-developed outer lobe, some spines near apical third of lateral margin and apex pointed and directed backwards; area of outer lobe forming dorsal process variable in shape and directed medially. Copulatory pieces with pair of large and subequal medial sclerites pointed apically.

Female: Similar to male except head not modified, but with two vertexal foveae near eyes (lacking in male), thick and deflected frontal lobe delimited posteriorly by deep transverse furrow crossing entire frons, and eyes smaller and less protruding. Metaventrite, abdominal sternites, and legs unmodified.

Collecting data: Collected from August to April in different types of forests (*Nothofagus* spp. forest, evergreen forest, valdivian rainforest, mature beech forest, low secondary valdivian rainforest, grazed secondary valdivian rainforest remnants, disturbed valdivian rainforest, mixed forest) at elevations ranging from 10 m to 1000 m. Many specimens came from sifted samples of leaf and log litter, also with mosses and lichens on dead trunk, or vegetable detritus, or fungi. A good number of specimens, especially males, have also been collected by flight intercept traps, car netting, window traps, and at UV light.

Distribution: *Achilia bicornis* is known from southern and central Chile ranging from Aysén Province to Concepción Province (Fig. 84: red circle). We have also examined a female from: "Región Magallanes y de la Antártica Chilena: Magallanes prov.: MSNG; 1 ♀; Fuerte Bulnes, TC-264; 04.II.1990; T. Cekalovic", which could be attributed to this species. However, considering that this report would be based only on a female from a region quite distant from the area

currently delimited for *A. bicornis* this placement requires confirmation and we do not take this record into consideration for the distribution map.

Comments: We have examined the types series (holotype and paratypes) of *A. simpsoni* Franz 1996, housed in NHMW, and found that the males and females fit perfectly into our definition of *A. bicornis* Jeannel, 1962. Therefore, we here place *A. simpsoni* Franz, 1996 as a junior synonym of *A. bicornis* Jeannel, 1962 (**syn. nov.**).

In the original description Jeannel (1962: 421) mentions that this species was described from 50 specimens collected by Kuschel in Chepu on 2.X.1958 and 17.X.1958, and some specimens collected by Holdgate at the same locality on 20.X.1958. However, in the examined collection we did not find any specimens collected by Holdgate, while only 14 specimens of the type series were collected by Kuschel on the dates indicated by Jeannel (i. e. the holotype and 9 paratypes on 2.X.1958 and 4 paratypes on 17.X.1958). Twenty-three additional specimens, all housed in MNHN and collected by Kuschel in Chepu and labeled as paratypes, were collected on different dates (i.e. 10 paratypes on 04.X.1958; 2 paratypes on 13.X.1958; 2 paratypes on 15.X.1958; and 9 paratypes 16.X.1958), details most likely overlooked by Jeannel.

The males of this species are easily distinguished from congeners by the peculiar shape of the head (Figs 79-82) and of the aedeagus (Figs 9-11). For the females the thick frontal lobe of the head that is delimited posteriorly by a deep transverse furrow that crosses the anterior part of frons is diagnostic.

Achilia chilotides Newton, 2017

Achilia chilotides Newton, 2017: 10, new name for *Achilia chilota* Franz, 1996 a junior homonym of *Achilia monstrata chilota* Jeannel 1962.

Achilia chilota Franz, 1996: 117, fig. 67 (aedeagus).

Type material (3 ex.): SOUTHERN CHILE: Región Los Lagos: Chiloé prov.: NHMW; 1 ♂ (holotype); labels verbatim “Chiloé Island, Huillinco Lake, TC-384, 09.II.1994, T. Cekalovic / Holotype / *Achilia chilota* (handwritten by Franz)”. – NHMW; 2 ♂ (paratypes); labels verbatim “Chiloé Island, Huillinco Lake, TC-384, 09.II.1994, T. Cekalovic / Paratype / *Achilia chilota* (handwritten by Franz)”.

Comments: We have examined the types series of *A. chilotides* Newton, 2017, housed in NHMW. The holotype and paratypes all belong to *A. excisa* (Schaufuss, 1880), a species we recently revised (Kurbatov *et al.*, 2018). Therefore, we here place *A. chilotides* Newton, 2017 as a junior synonym of *Achilia excisa* (Schaufuss, 1880) (**syn. nov.**).

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Taxonomic notes on the genus *Cyphochilus* Waterhouse, 1867 (Coleoptera, Scarabaeoidea, Melolonthinae) with description of 10 new species

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Abstract: This work presents a revision of *Cyphochilus* species characterized by smooth elytra and mesocoxae separated by armed mesosternum. The type material was examined and compared to more than 500 specimens from historical collections as well as recently collected ones. Lectotypes are designated for *Melolontha candida* Olivier, 1789, *Cyphochilus cylindricus* Brenske, 1903, *C. flavomarginatus* Frey, 1971, *C. peninsularis* Arrow, 1938, *C. pygidialis* Nonfried, 1893, *C. pygidialis* v. *angeri* Nonfried, 1893, *C. septentrionalis* Waterhouse, 1867, *C. testaceipes* Fairmaire, 1902, *C. tricolor* Waterhouse, 1867, and *C. vestitus* Sharp, 1876. *Cyphochilus septentrionalis* is resurrected from synonymy (**name rest.**) and the following synonymies are established: *C. pygidialis* Nonfried, 1893 = *C. septentrionalis* **syn. nov.**, *C. cylindricus* = *C. proximus* Sharp, 1876 **syn. nov.**, *C. vestitus* = *C. tricolor* **syn. nov.** *Cyphochilus testaceipes* is transferred to *Dasylepida* Moser, 1913 as *Dasylepida testaceipes* (Fairmaire, 1902) **comb. nov.** *Cyphochilus candidus*, *C. carinchebanus* Brenske, 1903, *C. feae* Brenske, 1903, *C. flavomarginatus*, *C. obscurus* Sharp, 1876, and *C. peninsularis* are confirmed valid species, redescribed, and their distribution updated. Ten new species are described: *Cyphochilus gandhii* **n. sp.**, from NE India, *C. hmong* **n. sp.**, from Laos, *C. leducthoi* **n. sp.**, from Vietnam, *C. orbachi* **n. sp.**, from Vietnam, *C. reichenbachii* **n. sp.**, from Vietnam, *C. rohingyae* **n. sp.**, from West Malaysia, *C. sansuukyii* **n. sp.**, from Myanmar, *C. satyarthii* **n. sp.**, from Sikkim and West Bengal, *C. tenzingyatsoi* **n. sp.**, from Tibet, and *C. zuercheri* **n. sp.**, from Thailand and Myanmar. The parameres of the 19 species treated are illustrated in three projections. A checklist of the resulting 38 valid species of *Cyphochilus* is provided with their distribution.

Keywords: Morphology - Systematics - Taxonomy - Geographic distribution - India - Nepal - China - Asia - Himalaya - Thailand - Laos - Cambodia - Vietnam - Arthropoda - Insecta - Scarabaeidae.

INTRODUCTION

The improved political and social situation in the South East Asia greatly contributed to improve the knowledge of its fauna and to focus on conservation problems and on the development of national scientific Institutions. Several collaborative programs have been established with foreign Institutions and scientists for the systematic sampling of the northern areas of Vietnam, Laos, and Myanmar. This has resulted in a large number of insect specimens, including Melolonthine Scarabaeidae, becoming available for study in museums and private collections.

The genus *Cyphochilus* Waterhouse, 1867, which has only been treated superficially until now, is in need of a revision to accommodate new species and for a comprehensive assessment of the phylogenetic relationships of the taxa. To that end, I began in 2000 gathering available

specimens of *Cyphochilus* species, including type specimens, for a comprehensive morphological analysis. The primary focus of the analysis was on the aedeagus due to its paramount importance for a reliable species identification.

This work presents the results of the study and revision of a “Section” of the genus defined by Waterhouse (1867) as “the species having the mesosternum armed by a spur”. Other “Section” will be treated subsequently in order to complete the revision of the genus *Cyphochilus*, and only then I will provide an identification key to all the species. I also plan to investigate the phylogenetic relationships within the genus as well as with the related genera *Dedaloapterus* Sabatinelli & Pontuale, 1998 and *Malaisius* Arrow, 1941, although revised by Li & Yang (1999).

MATERIAL AND METHODS

Specimens: Material for this study was borrowed from, or deposited in the institutions listed below with acronyms as given in Evenhuis (2007):

BMNH	Natural History Museum, London, Great Britain.
HNHM	Hungarian Natural History Museum, Budapest, Hungary.
ISNB	Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium,
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland.
NHMB	Naturhistorisches Museum, Basel, Switzerland.
MNHN	Muséum national d'Histoire naturelle, Paris, France.
MSNG	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy.
MTD	Museum für Tierkunde, Dresden, Germany.
MZUF	Museo Zoologico «La Specola», Florence, Italy.
NHRS	Naturhistoriska Riksmuset, Stockholm, Sweden.
NMW	Naturhistorisches Museum Wien, Wien, Austria.
NMPC	National Museum (Natural History), Prague, Czech Republic.
PCAR	private collection Andreas Reichenbach, Leipzig, Germany.
PCDK	private collection Denis Keith, Chartres, France.
PCMN	private collection Milan Nikodým, Prague, Czech Republic.
PCAB	private collection Ales Bezděk, Branisovska, Czech Republic
ZMAN	Universiteit van Amsterdam, Instituut voor Taxonomische Zoologie, Zoologisch Museum, Amsterdam, Netherlands.
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

All specimens in the collection of the author were donated to the MHNG and integrated in the general collection, but their origin is given on the labels.

The institution holding the type specimens is always given by the museum acronym at the begin of the text in the sections "Material examined", followed by the catalogue number in brackets if available, then followed by the label information. Type specimens held by the MHNG and registered in their collection database have a catalogue number with the format MHNG-ENTO-#####. Information of type series specimens given on the specimen labels is reported *verbatim* and the used signs indicate:

- // separates data on different labels; if not indicated otherwise, they are on rectangular white labels;
- / line separation on same label;

[...] square brackets contain comments of the author relating to *verbatim* data;

[sic] indicates a mistake in the original data label;

(H) indicates handwritten;

(P) indicates printed.

All other specimen information follows the standards of the journal, with specimen lots separated by the character combination ". –".

For some species, specimens labeled as "type" and even belonging to the same sampling event, are sometimes distributed in different Museums; this is particularly evident for the species described by Brenske, Sharp and Nonfried present in the BMNH, ISNB, MNHN and MTD; therefore lectotypes were designated whenever necessary.

Male genitalia: Aedeagi were dissected and cleaned manually without any chemical treatment, then glued to a cardboard pinned under each specimen from which they were removed.

Morphological terminology: Follows Torre-Bueno *et al.* (1989).

Images and measurements: A Leica DFC425 camera in conjunction with a Leica M205C stereo microscope was used to produce source images, which were subsequently stacked using the software Zerene Stacker, and adjusted and grouped in plates using Adobe Photoshop.

Descriptions: Due the relative uniformity of the general morphology of *Cyphochilus* in contrast with the extreme diversification of the parameres, only the characters useful for the identification and for the differential diagnosis are considered. The common characters for the species of *Cyphochilus* are listed in the generic diagnosis.

Distribution data: Label data of the examined specimens was used to infer the geographical distribution. Due to the high number of sibling species and the splitting into new species, I consider most previously published distributions as likely inaccurate. In the historical collections, there are a large number of specimens with very imprecise collection data (*i.e.* Himalaya, Bengal, Hindukush, Oriental India, Siam, and Indochina). In some cases, the data appear to be evidently unreliable; these data are therefore excluded in defining the distribution of the species. The presence of sibling species in *Cyphochilus* makes identification reliable only for male specimens; therefore, single female specimens received a tentative identification and were not taken into consideration in defining the distribution of species.

Abbreviations: Characters, measurements, mensural procedures, and ratios are as follows:

BL: Body length, measured from anterior margin of clypeus to apex of elytra, in dorsal view.

- BW: Body width, measured across the elytral humeri, in dorsal view.
- BWX: Greatest body width, measured across the elytral maximal width, in dorsal view.
- CW/L: Clypeal ratio, derived from width measured along clypeo-frontal suture divided by greatest length of clypeus.
- F/O: Interocular ratio, derived from minimum frons width across eyes divided by transverse compound eye diameter in dorsal view.
- A2-7L/CL: Antennal ratio, derived from length of basal segments 2-7 divided by antennal club length.
- PnW/L: Pronotal ratio, derived from pronotal greatest width divided pronotal length along midline, in dorsal view.
- MstL: Mesosternal process length, in lateral view.

TAXONOMY

Genus *Cyphochilus* Waterhouse, 1867

Synthetic history of the genus: Waterhouse (1867: description of the genus and of 5 species); Sharp (1876: description of 3 species); Nonfried (1893: description of one species); Fairmaire (1902: description of 2 species); Brenske (1903: description of 8 species); Dalla Torre (1912: catalogue of 26 species); Moser (1915: description of one species and syn. *ventritectus* Brenske, 1903 = *ochraceosquamosus*); Arrow (1938: description of one species); Medvedev [1951: designation of the type species = *C. candidus* (Olivier, 1789)]; Frey (1971: description of one species); Sabatinelli & Pontuale (1998: description of *Dedaloapterus* with redefinition of *Malaisius* Arrow, 1941 and *Cyphochilus*); Li & Yang (1999: revision of *Malaisius* and notes on *Cyphochilus*); Krajčik (2012: catalogue of 32 species); Bezdek (2016: catalogue 12 Palaearctic species).

Type species: *Melolontha candida* Olivier, 1789 by subsequent designation (Medvedev, 1951: 231).

Etymology: The name is derived from the Greek words χιφο=divided, χεילו = labrum.

Diagnosis: The following combination of characters distinguishes *Cyphochilus* from the other related genera of Melolonthinae: elytra with scales uniformly distributed; apical segment of maxillary palps narrow and long, without any callus or excavation on its outer surface; labrum strongly asymmetric; lateral margin of prothorax regularly curved; claws long and with large base; parameres strongly asymmetric.

Description: The genus *Cyphochilus* is defined by the following characters: body with integument brown to entirely black; upper surface of body covered with scales not forming white spots nor stripes; pygidium and abdomen without metallic reflex; antenna

10-segmented; antennal club in males and females 3-segmented; antennal club in males large, generally longer than footstalk (Fig. 21) more rarely as long as footstalk, or even shorter (Fig. 22); footstalk in males with third and fourth segments subequal; claws large at base, not cleft at apex with basal tooth beneath, lower margin simple; outer and inner teeth subequal; dorsal margin of claws uniformly curved; apical segment of maxillary palp narrow not excavated; labrum not transverse, deeply sinuate, strongly asymmetric; mentum transverse, with Y-shaped carina; clypeus semi-circular, not very large, laterally continuous with canthus, flat or concave and separated from front by suture; front flat, with lateral margin near eyes not elevated; eyes not prominent; vertex concave; prothorax transverse with lateral margin regularly curved, simple, not serrated, without erect setae, anterior and posterior margin not margined, posterior margin without erect setae; elytra with four elevated costae in addition to sutural one (Fig. 20) or completely without costae (Fig. 19); pygidium rounded or triangular, in males without any tubercle; mesosternum not produced (Fig. 16) or produced between mesocoxae (Figs 17-18); metasternum with long hairs, shining; metepisternum narrow, more than three times as long as its breadth with metepimera small; abdominal sternites with scales, laterally without white spots; abdominal sternites connate with sutures absent in middle; sixth abdominal sternite not retracting under the fifth sternite; last spiracle located on suture between fifth visible abdominal sternite and propygidium; anterior coxae transverse, not prominent; mesofemur in males not enlarged; not projecting out laterally from body very much; anterior tibiae in males 1-3-toothed, in females 3-toothed; in males and females with spurs, located in front of hollow between basal and median tooth; external margin of protibiae not transparent; hind and middle tibiae in both sexes without complete transverse carina (a tubercle is present externally); dorsal margin of hind tibiae without teeth or spines; tarsomeres thick and short, sparsely pilose beneath; first segment of hind tarsi subequal or shorter than second; wings and humeral callus developed in males and females; posterior coxae not close to the median coxae in both sexes; parameres fused basally, generally strongly asymmetric bilobate or simple; endophallus membranous.

Remarks: The genera closest to *Cyphochilus* are *Malaisius* Arrow, 1941 and *Dedaloapterus* Sabatinelli & Pontuale, 1998, from which it is distinguishable by the characters already indicated in the diagnosis.

Due to the 3-segmented antennal club, that differentiates *Cyphochilus* from all other Melolonthinae, this genus has been included in the tribes Rhizotrogini (Medvedev, 1951) or Leucopholini (Bezdek, 2016), with a prevalence for the latter. Matsumoto (2010) has rightly questioned

the validity of the tribe Leucopholini as natural group. In a recent molecular phylogenetical analysis (Eberle *et al.*, 2019), two genera of Leucopholini, namely *Dedalopterus* and *Psilopholis* Brenske, 1892, tested with other few genera of Melolonthini, showed affinities to two different lineages. However, the phylogenetic relationships of Melolonthinae are far from being fully understood and therefore I prefer to treat, for the time being, *Cyphochilus* at the level of the subfamily Melolonthinae *incerta sedis*. The different species of the genus *Cyphochilus* stand out among the Melolonthinae for the extraordinary parameres that evolved, like in the Sericini, in diverse forms and thus making it easy to differentiate the species. Both the shape of the aedeagus and the external morphology allow a certain grouping of the species, at least for some of them. Waterhouse (1867) recognized that it was possible to distinguish species having a “mesosternum armed with a spur” which he grouped in Sect. 1 and species having a “mesosternum unarmed” which he grouped in Section 2. This work examines the species of the Section 1, in which the species have also as another shared trait, the elytra are smooth and lack elevated striae.

Formal names are not proposed for these “Sections”, as their purpose is to facilitate treating and identifying the species. They are not intended to represent phylogenetic clades.

Section 1a

Species with mesosternum armed with a long spur: length in lateral view 1-2 mm (Fig. 18).

Cyphochilus candidus (Olivier, 1789)

Figs 8, 18, 23-25, 80-81

Melolontha candida A.G. Olivier, 1789: Vol. 1, g. 5, p. 15, pl. VIII, fig. 98.

Type material examined: Lectotype, by present designation: MNHN; 1 ♂; INDIA OR: // *candidus* Ol / India or. (H) // Co-Type (H on red) // Muséum Paris / 1952 / coll. R. Oberthur //. (Figs 8, 80).

Additional material examined: 118 specimens.

NEPAL: MTD; 1 ♂, 2 ♂; Syangia distr., 2-10 km East Sangya, 1200-1600 m; 22-26.VII.1995; No. 112, leg. G. Csorba. – HNHN; 1 ♂; same data as previous. – NHMB; 2 ♂, 1 ♀; Kathmandu valley, Godavari, 1500 m; 19.V.1989; leg. M. Brancucci. – NHMB; 1 ♂, 6 ♀; Bagmati, Umg Kathmandu; 28-30.VI.1989; leg. M. Brancucci.

SIKKIM: NHMB; 1 ♂ 3 ♀; Rangopo, 680 m; 3.VIII.1981, leg. B. Bhakta. – NHMB; 1 ♀; Mirik Top, 1260 m; 14.IX.1980; leg. B. Bhakta. – NHMB; 2 ♀; Tengling-Yoksam, 1200-1700 m; leg. B. Bhakta. – NHMB; 1 ♀; Sakyong, 1140 m; 15.IX.1981; leg. B. Bhakta. – NHMB; 1 ♂; Jadung, 800 m; 7.VII.1895; leg. Ch. J. Rai. – NHMB; 2 ♂; Rangali, 1500 m; 9.VII.1985; leg.

Ch. J. Rai. – ISNB; 1 ♂; R. Ley coll. & det. – MTD 2 ♂; *sub sylhetinus* Brsk [unpublished, unavailable name]. **ASSAM:** BMNH; 1 ♂; leg. W.F. Badgley 1906-185. – PCMN; 1 ♂; Kaziranga, Pan Bari, Wild life Res. Forest; leg. S. Murzin. – HNHN; 1 ♂; ex coll. Felsche 1918. – MTD; 2 ♂; Kohima, V.M. Duchon. – NMW; 1 ♂; same data as previous. – ZMAN; 1 ♂, Assam. – MTD; 1 ♂; W.H. Muche, Redeberg, Ankauf. – ISNB; 1 ♂; ex coll. Ogier de Baulny. – MHNG; 2 ♂; PCMN; 3 ♂; Nambor Res. For. Garampani, 100 m; 25-29.XI.1997; leg. V. Siniaev & V. & S. & M. Murzin.

WEST BENGAL: NHMB; 2 ♀; Jalpaiguri distr., Bagra Kote, 250 m; 16-22.XII.1985; leg. B. Bhakta. – MHNG; 6 ♂; Darjeeling, ex coll. Petrovitz. – ISNB; 1 ♂; leg. R.P. Verschraegen 1908. – NHMB; 1 ♂; Kalimpong, Pedong; leg Bhakta Bahadur 1978. – NHMB; 1 ♂; 700 m, 6.VIII.1981. – NHMB; 1 ♂; Tista, 230 m; 10.VII.1981; leg. B. Bhakta. – MHNG; 1 ♂; Gorubathan, 185 m; 2.VIII.1985; leg. B. Bhakta. – NMPC; 1 ♂; same data as previous. – NHMB; 1 ♂; same data as previous. – NHMB; 5 ♀; Kalimpong, Pankha Banglo; 9.VIII.1978. – NHMB; 1 ♂, 2 ♀; Kalimpong; 5-24.VII.1961; leg. B. Bhakta. – NHMB; 1 ♂, 3 ♀; Kalimpong, 9th mile, 1500 m; 14.VII.1984; leg Ch. J. Rai. – MHNG; 1 ♀; Pedong, 700 m; 6-14.VIII.1981; leg. B. Bhakta. – NHMB; 1 ♂, 1 ♀; Pankha Sari, 8.VIII.1978; leg. B. Ch. Bhakta. – NHMB; 1 ♂, 4 ♀; Nowri Khola, 2200 m; 12.VIII.1978; leg. B. Bhakta. – NHMB; 1 ♂, 1 ♀; Gurubathan, 350 m; 15-19.V.1986; leg. B. Bhakta. – NHMB; 5 ♂, 3 ♀; Dek; 22.VII.1985; leg. B. Bhakta.

MEGHALAYA: MTD; 2 ♂; Khasi Hills; ex coll. Felsche – MHNG; 1 ♂; Shillong.

MANIPUR: BMNH; 1 ♂; Doherty, ex coll. Boucard – ISNB; 2 ♂; ex coll. J. Muller.

MYANMAR: NMPC; 1 ♂ 1CMARoll. Nonfried.

INDIA (generic): MHNG; 3 ♂; ex coll. J. Thomson. – ISNB; 2 ♂; ex coll. P. de Moffarts. – ISNB; 1 ♂, 3 ♀; ex coll. Madon. – ISNB; 1 ♂; ex coll. J. Muller. – INDES: MHNG; 1 ♀; Bengale, Chassot, VIII.1903.

HIMALAYA (generic): NMPC; 3 ♂, 2 ♀; ex coll. Kallert, Amburg. – MNHN; 1 ♂; ex coll. Nonfried. **HINDUSTAN (generic):** ISNB; 1 ♂; E. Deyrolle 1869, ex coll. de Borre. **BENGAL:** ISNB; 1 ♂; Bengal. – MNHN; 1 ♂; same data as previous.

Description of the lectotype male: *Size* – BL: 23 mm, BW: 10 mm, BWX: 12.5 mm, situated in the distal third of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales uniformly white cream, more dense along sides of pronotum and margins of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus gradually rounded posteriad; frons large, making eyes not prominent (F/O: 6); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins

gently curved, basal angles obtuse and smooth. *Elytra* – Without any stria visible. *Thoracic sterna* – With long, yellowish-brown pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 2 mm), pointed and curved dorsally (Fig. 18). *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth subequal to middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; left paramere with flat spur (Figs 23-25).

Variability: BL: 20.5-26 mm ($x = 23.5$, $n = 66$); vestiture of scales may be of any intermediate color between white (Fig. 80) and yellow (Fig. 81).

Females: Antennal club ovoid much shorter than in the males and preceding antennomeres A2-7/CL: 1.4).

Type locality: The type locality is generically “Indes Orientales” or East Indies that referred in colonial time to the lands of South (Indian subcontinent) and Southeast Asia thus making very difficult to define an exact location. Burmeister (1855) indicates as additional information for the species origin Malabar, situated on the West coast of India and outside of the geographical distribution area of the genus *Cyphochilus*; therefore, this information is not considered valid.

Distribution: The confirmed records for this species show a quite large distribution from Nepal to North Myanmar including Sikkim, Darjeeling, Assam, Meghalaya, West Bengal, and Manipur.

Remarks: The specimen marked as “Co-typus” might be of doubtful authenticity as the specific epithet on the label should be *candida* and not as given *candidus* because the original combination was *Melolontha candida*. However, this is the closest specimen to this species we could find in the Olivier collection (MNHN) and therefore it is designated here as lectotype in order to stabilize the nomenclature. *Cyphochilus candidus*, *C. septentrionalis*, *C. gandhii*, *C. satyarthii* and *C. tenzinyatsoi* are very close in the external morphology and they inhabit the same geographical area in the north East of Himalaya. Therefore, they were often confused in the past, as it is evident from the misidentifications in the old collections. They may be considered a group of species with parameres generally only slightly asymmetric and curved dorsally; they remain easily distinguishable from the characters of the parameres and *C. candidus* left paramere bears a flat spur absent in all other species of this group. In some old collections, there are a few specimens of *C. candidus* identified as *C. sylhetinus* Brenske, however, this name has never been published.

Cyphochilus flavomarginatus Frey, 1971

Figs 6, 41-43

Cyphochilus flavomarginatus Frey, 1971: 122, figs 11-13.

Type material examined: Lectotype by present designation: NHMB; 1 ♂; LAOS: // Typus (P on red) // Laos, 1967 / Vientiane / leg. Ardoin (P) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 n. sp. (P&H) //. – Paralectotypes by present designation: NHMB; 4 ♀; // LAOS, 1967 / Vientiane / leg. Ardoin (P) // Paratype (P on red) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 (P&H) //. – Paralectotypes by present designation: NHMB; 1 ♂; // Paratype (P on red) // Sud Laos [South LAOS] / 1967 / Paksé / leg. Ardoin (P) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 (P&H) //. (Fig. 6).

Description of the lectotype male: *Size* – BL: 23 mm, BW: 11 mm, BWX: 13.5 mm, situated in the third distal of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales more dense along sides of pronotum and margins, white cream on discal part of pronotum, discal part of elytra and margins of elytra, yellow on the head, lateral part of pronotum and pre-marginal sides of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and divergent posteriad; frons large, making eyes not prominent (F/O: 6); antennal club only slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins gently curved, basal angles obtuse and smooth. *Elytra* – Without any visible stria. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 2.2 mm), pointed and curved dorsally. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate; slender apical tooth bigger than the middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; apex of both parameres prolonged in a spike (Figs 41-43).

Female: BW: 14.2 mm; BL: 25 mm; antennal club ovoid, shorter than preceding antennomeres (A2-7/CL: 2.4).

Type locality: Vientiane, capital of Laos.

Distribution: The species is known only from two localities in Laos: Vientiane (Lectotype) and Paksé. Paksé, or Pakxe, is the capital of the southern Laotian Province of Champasak (15°7'0"N, 105°47'0"E; 120 m alt.), located at the confluence of the Xe Don and Mekong Rivers.

Remarks: *Cyphochilus flavomarginatus* is a large species easy to recognize by the smooth aspect of elytra having their maximum width distally and by yellowish

band around the sides of the body from the head to the apex of elytra. *Cyphochilus flavomarginatus* is close to *C. sansuukyii* from which is easily recognizable by the shape of parameres (Figs 41-43 and 44-46).

In the original description, Frey (1971) mentioned 6 specimens, all from Vientiane. However in six specimens labeled as types in his collection one male is from Paksé, what was apparently overlooked by him; so despite this is in contradiction with the description, it is also designated as paralectotype. The drawing of parameres showed by Frey in the description refers to the lectotype that unfortunately has damaged parameres; the Figs 42-43 present the real shape of parameres from the paralectotype from Paksé.

***Cyphochilus septentrionalis* Waterhouse, 1867
restored name**

Figs 1-3, 9, 19, 22, 26-28, 86

Cyphochilus septentrionalis Waterhouse, 1867: 141.

Cyphochilus pygidialis Nonfried, 1893: 332. **new synonym**

Cyphochilus pygidialis v. *angeri* Nonfried, 1893: 333.

***C. septentrionalis* type material examined:** Lectotype by present designation: BMNH; 1 ♂; HIMALAYA: // *C. septentrionale* / Waterh. Type (H) // Type (P round label with red border// n / Ind (H black on blue, round label) // (Figs 3, 86). – Paralectotype, by present designation; BMNH; 1 ♂; // *Cyphochilus* / *septentrionalis* / co-type Wat. (H) //.

***C. pygidialis* type material examined:** Lectotype by present designation: ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya [sic] (P black on white, black line border) // *pygidialis* / type ♂ Brsk (H on red) // (Fig. 1). – Paralectotypes by present designation, with identical label than lectotype as follows: ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya [sic] (P black on white, black line border) // *pygidialis* / type ♂ Brsk (H on red) // (Fig. 1). – ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya (P) // *Cyphochilus* / *pygidialis* / type Nonfried (H, black on white) // . – Paralectotype by present designation: ISNB; 1 ♂ // Coll. Nonfried / Hymalaya [sic] (P, black line border) // *Cyphochilus* / *pygidialis* / Nonfried ex typ. (H) // . – Paralectotypes, by present designation: ISNB; 8 ♂, 6 ♀; pinned on row being the first specimen the sole with an identification label // Coll. Nonfried / Hymalaya (P, black line border) // Type (P red on white, black line border) // . – Paralectotype by present designation: ISNB; 1 ♀; // Darjeeling / coll. Nonfried (H) // COTYPE (P on red, black border) // . – Paralectotype by present designation: NMPC; 1 ♂; // Coll. Nonfried / Hymalaya (P black line border) / TYPUS (P on red, black line border // *C.* / *pygidialis* / Nonfried (H red line border) // . – Paralectotype by present designation: NMPC; 1 ♀; // Coll. Nonfried / Hymalaya (P black line border) // TYPUS (P black on red, black line border

// . – Paralectotype by present designation: NMPC; 5 ♀; // Coll. Nonfried / Hymalaya (P black line border) / TYPUS (P on red, black line border) // *pygidialis* / Nonfried typ Hymal (H on yellow, black line border) //.

***C. pygidialis angeri* type material examined:** Lectotype by present designation: ZMHB; ♂; // Coll. Nonfried / Hymalaya (P black line border) // *Cyphochilus* / v. *angeri* Nfr (H on green, black line border // (Fig. 9).

Additional material examined: 54 specimens.

UTTAR PRADESH: MTD; 1 ♂; Saharanpur.

NEPAL: MTD; 3 ♂, 2 ♀.

SIKKIM: MTD; 1 ♂; Sikkim.

ASSAM: ZMHB; 1 ♂; Assam; sub *Cyphochilus assamensis* Brenske, Type [unpublished name]. – MNW; 1 ♂; same data as previous. – MTD; 3 ♂; same data as previous.

BANGLADESH: MHNG; 1 ♂; Silhet, ex Museo Sharp.

MEGHALAYA: BMNH; 1 ♂, ISNB; 2 ♂, NMPC 1 ♀; Shillong. – ISNB; 1 ♂; MTD 1 ♀; Khasi Hills.

NAGALAND: ISNB; 1 ♂, 3 ♀; MTD; 1 ♂; Naga Hills; Kohima, leg. V. M. Duchon, ex coll. P. de Moffarts.

WEST BENGAL: MHNG; 1 ♂, 1 ♀; ISNB; 1 ♂; Kalimpong, Pedong.

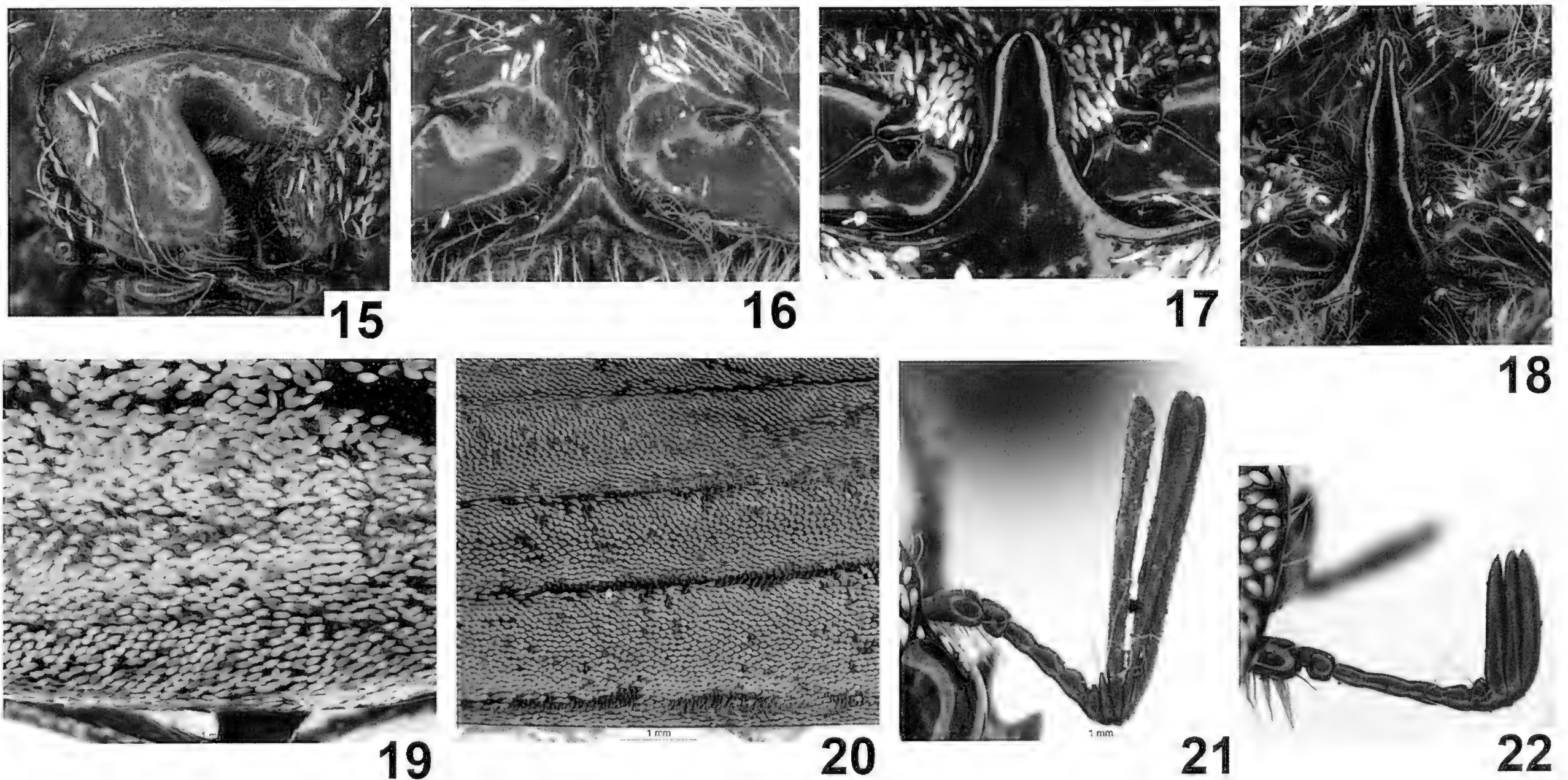
INDIA (generic): NHRS; 1 ♂; India.

HIMALAYA: ISNB; 4 ♂. – ZMHB; 2 ♀, 4 ♂. – MNW; 2 ♂, 1 ♀. – NMPC; 3 ♂, 4 ♀. – MHNG; 1 ♂. – MTD; 3 ♂, 3 ♀; (all specimens ex coll. Nonfried).

Description of the lectotype male (BMNH): *Size* – BL: 19.2 mm, BW: 8 mm, BWX: 10.4 mm, situated at midpoint of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales uniformly white cream more dense and whitish along sides of pronotum and margins of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus straight posteriad; frons large, making eyes not prominent (F/O: 6.8); clypeofrontal suture faint; antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.1) (Fig. 22). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex, slightly concave just behind eyes; apical angles flattened, acute, slightly protuberant; basal lateral margins straight, basal angles obtuse and smooth. *Elytra* – Without any elevated visible stria (Fig. 19). *Thoracic sterna* – Surface with short, yellowish-brown pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 1.3 mm), pointed and curved dorsally. *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin largely reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth bigger than the middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; left paramere in its ventral portion with a spur directed frontally, another smaller spur is present in the ventral



Figs 1-14. Original labels of type material. (1) *Cyphochilus pygidialis* Nonfried, 1893. (2) *C. pygidialis* Brenske [sic]. (3) *C. septentrionalis* Waterhouse, 1867. (4) *C. obscurus* Sharp, 1876. (5) *C. proximus* Sharp, 1876. (6) *C. flavomarginatus* Frey, 1971. (7) *C. cylindricus* Brenske, 1903. (8) *Melolontha candida* (Olivier, 1789). (9) *Cyphochilus pygidialis* v. *angeri* Nonfried, 1893. (10) *C. feae* Brenske, 1903. (11) *C. vestitus* Sharp, 1876. (12) *C. tricolor* Waterhouse, 1867. (13) *C. testaceipes* Fairmaire, 1902. (14) *C. peninsularis* Arrow, 1938.



Figs 15-22. General morphology of *Cyphochilus*. (15) Labrum, in frontal view of *Cyphochilus farinosus* Waterhouse, 1867. (16) Mesosternum, in ventral view of *C. farinosus*. (17) *C. proximus* Sharp, 1867. (18) *C. candidus* (Olivier, 1789). (19) Lateral side of right elytra of *C. septentrionalis* Waterhouse, 1867. (20) *C. farinosus*. (21) Antennal club ♂ of *C. hmong* n. sp. (22) *C. septentrionalis* ♂.

distal part of the right paramere, apical part of the right paramere with a deep hollow (Figs 26-28).

Variability: BL: 18-20 mm ($x = 19.4$, $n = 48$); vestiture of scales may be of any intermediate color between white and cream.

Females: Antennal club length much shorter than on the males (A2-7/CL: 1.4).

Type locality: The type locality for *C. septentrionalis* is generically "India" and for its synonym *pygidialis* is vaguely "Himalaya". The type specimens were collected in the late 1800's probably in the northeastern territories of India while it was under the rule of the British Crown.

Distribution: The confirmed records for this species indicate a presence from Uttar Pradesh to Nagaland including Nepal (however, no more precise records are available for this country and need to be confirmed), West Bengal Sikkim, Assam, Meghalaya, and Bangladesh.

Remarks: *Cyphochilus septentrionalis*, was considered until now (Dalla Torre, 1912; Bezdek, 2016) as a smaller form and synonym of *C. candidus*. The study of the types reveals that *C. septentrionalis* is in reality well distinct from *C. candidus*, and that *C. pygidialis* and *C. pygidialis* v. *angeri* are junior synonyms. The particular form of the parameres with two ventral spikes (Fig. 26) is sufficient to easily distinguish this species from the closest species *C. candidus*, *C. gandhii*, and *C. tenzingyatsoi*. In some old collections, there are few specimens of *C. septentrionalis* identified as *C. assamensis* Brenske, a name that has, however, never been published and is thus unavailable.

Cyphochilus gandhii n. sp.

Figs 32-34, 84

Holotype: MHNG (MHNG-ENTO-81686); 1 ♂; WEST BENGAL: // INDIA / [West Bengal, Darjeeling] Kurseong / V.1975 (H) // HOLOTYPUS ♂ / *Cyphochilus* / *gandhii* mihi / G. Sabatinelli, 2020 (T on red) // (Fig. 84).

Paratypes: 78 specimens.

UTTAR PRADESH: BMNH; 1 ♂; Allahabad (sub. *C. candidus* det. Waterhouse).

WEST BENGAL: ISNB; 8 ♂, 8 ♀; Kurseong (sub *C. pygidialis* det. Moser). – MHNG; 4 ♂, 6 ♀; same data as previous. – BMNH; 1 ♂; same data as previous (sub *C. candidus* det. Arrow). – HNHM; 1 ♂; same data as previous. – NMPC; 1 ♂; same data as previous (sub *C. candidus* det. Frey). – MHNG; 2 ♂, 6 ♀; Maria Basti [Christian church near Pedong]. – MHNG; 2 ♂, 3 ♀; Pedong. – MSNG; 1 ♂; same data as previous. – ISNB; 2 ♀; Darjeeling. – ISNB; 2 ♂, 1 ♀; Kolkata.

SIKKIM: ISNB; 2 ♂; Sikkim. – MTD; 3 ♂, 3 ♀; same data as previous.

ASSAM: MTD, 1 ♂; Assam. – MHNG 1 ♂; same data as previous.

ARUNACHAL PRADESH: NHMB; 8 ♂, 8 ♀; btw. Dirang & Bomdila pass., 27°19' N 92°22' E, 2200 m; 15.VI.2004; leg. L. Dembický.

INDIA (generically): ISNB 6 ♂.

Description of the holotype male: *Size* – BL: 21 mm, BW: 8.8 mm, BWX: 11.4 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown except for brown-reddish clypeus, antennal clubs, other appendices and legs; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.5; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 5.4); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.88). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles and lateral margins flattened, apical angles acute protuberant; basal lateral margins curved, basal angles obtuse and largely rounded. *Elytra* – Smooth, without any elevated stria. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum strongly developed anteriorly (MstL: 1.8 mm) between mesocoxae. *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate with basal tooth well developed; slender apical tooth as long as middle tooth. *Aedeagus* – Parameres strongly asymmetric (Figs 32-34); left paramere with a long ventral process that wrap the right one like in *C. tenzingyatsoi*; apical part of right paramere convex and pointed.

Variability: BL: 20-22.5 mm ($x = 21.5$, $n = 72$).

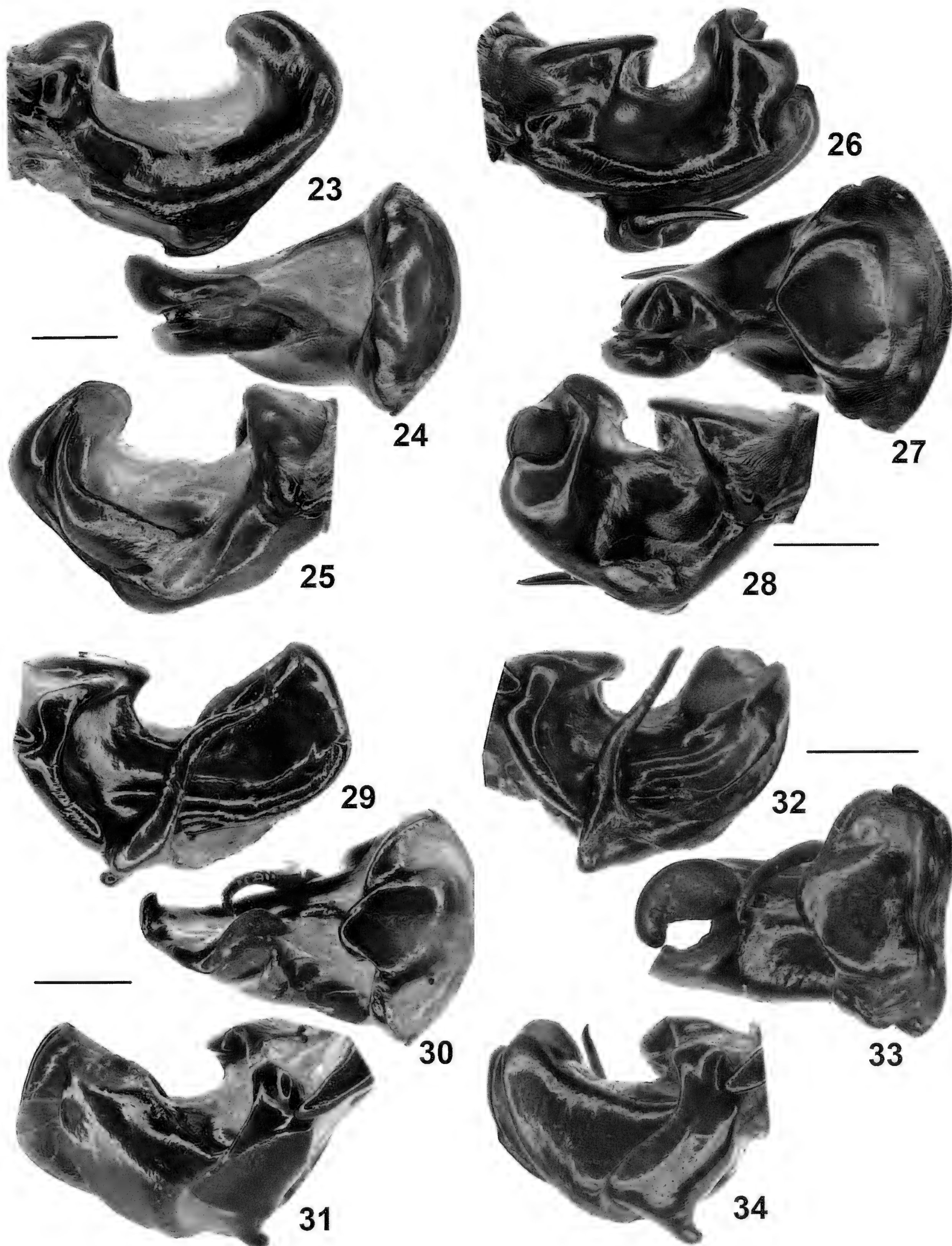
Females: BL: 22 mm; antennal club ovate, shorter than preceding antennomeres 2-7 (A2-7/CL: 1.8).

Etymology: Mohandas Karamchand Gandhi was an Indian lawyer and political ethicist who employed nonviolent resistance to lead the successful campaign for India's independence from British Rule and in turn inspired movements for civil rights and freedom across the World.

Type locality: Kurseong is a city and municipality in Darjeeling District in the Indian state of West Bengal.

Distribution: This species, quite abundant in the collections, shows a distribution concentrated in the Darjeeling municipality of West Bengal, with a few specimens also known from Sikkim, Assam and Arunachal Pradesh. Other old record localities are generic and may be unreliable.

Remarks: *Cyphochilus gandhii* can be readily separated from all other congeners by its: large body size, elytral



Figs 23-34. Parameres in right, dorsal, and left view. (23-25) *Cyphochilus candidus* (Olivier, 1789), lectotype. (26-28) *C. septentrionalis* Waterhouse, 1867, lectotype. (29-31) *C. tenzingyatsoi* n. sp., holotype. (32-34) *C. gandhii* n. sp., holotype. – Scale bars = 1 mm.

striae not elevated, mesosternum armed with a long spur and for the unique shape of the parameres. The morphological closest species is *C. tenzingyatsoi* from which it is easily distinguishable having antennal club longer than antennomeres 2-7 and the apex of the right paramere convex and pointed (Figs 29 vs. 32). In the collections, this new species was identified by Moser as *C. pygidialis* and by Arrow as *C. candidus*.

***Cyphochilus sansuukyii* n. sp.**

Figs 44-46, 88

Holotype: MHNG (MHNG-ENTO-81690); 1 ♂; MYANMAR: // Carin Chebà [Karen Hills] / 900-1100 m / L. Fea V XII-88 [1888] (P) // HOLOTYPUS ♂ / *Cyphochilus / sansuukyii mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 88).

Paratypes: 2 specimens.

MYANMAR: MHNG (MHNG-ENTO-81691 and 81692); 2 ♀; same collection data as the holotype, labeled as PARATYPUS ♀.

Description of the holotype male: *Size* – BL: 22 mm, BW: 8.8 mm, BWX: 12.3 mm, situated in the third distal of elytra. *Color* – Integument brown including antennal clubs and legs; dorsal surface with yellowish scales, more dense white scales along sides of pronotum and margins. *Head* – CW/L: 2.9; anterolateral edges of clypeus rounded in very obtuse angle, lateral edges of clypeus straight and divergent posteriad; frons large, making eyes not prominent (F/O: 5.7); antennal club of same length as antennomeres 2-7 (A2-7/CL: 1). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles not flattened, right, not protuberant; basal lateral margins almost straight, basal angles obtuse and rounded. *Elytra* – Without elevated striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum well developed anteriorly (MstL: 1.1 mm) between mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia bidentate as third tooth at the base is obsolete; slender apical tooth bigger than the other tooth. *Aedeagus* – Parameres very asymmetric; apex of both parameres prolonged in a spike (Figs 44-46).

Females: BL: 23.5 mm; antennal club shorter than preceding antennomeres (A2-7/CL: 1.7).

Etymology: Aung San Suu Kyi is a Burmese politician, diplomat, author, and recipient of 1991 Nobel Peace Prize for her democratic activities in Myanmar, from where the new species of *Cyphochilus* is described.

Type locality: The type locality, Carin Chebà on the original labels, corresponds nowadays to Karen Hills (750 m), in Myanmar. Leonardo Fea (Turin 24 July 1852 – 27 April 1903), who in 1872 was an assistant at the Museum of Natural History in Genoa, collected

the three specimens here described. He undertook several scientific expeditions including to Burma where he spent four years (1885-1889) accumulating large collections of insects and birds most of which are in the MSNG but also present in MNHN, ISNB, and MHNG.

Distribution: The species is known only from Karen Hills in Myanmar, one of the main hill ranges in eastern Burma located across the SW corner of Shan State and Kayah State.

Remarks: *Cyphochilus sansuukyii* is morphologically close to *C. flavomarginatus*: they are large species having smooth elytra which have with their maximum width distally and a yellowish or white band of scales around the sides of the body from the head to the apex of elytra. *Cyphochilus sansuukyii* is easily recognizable from *C. flavomarginatus* by having the antennal club of male of the same length as antennomeres 2-7 and by the different shape of parameres (Figs 44-46 vs. 41-43).

***Cyphochilus satyarthii* n. sp.**

Figs 35-37

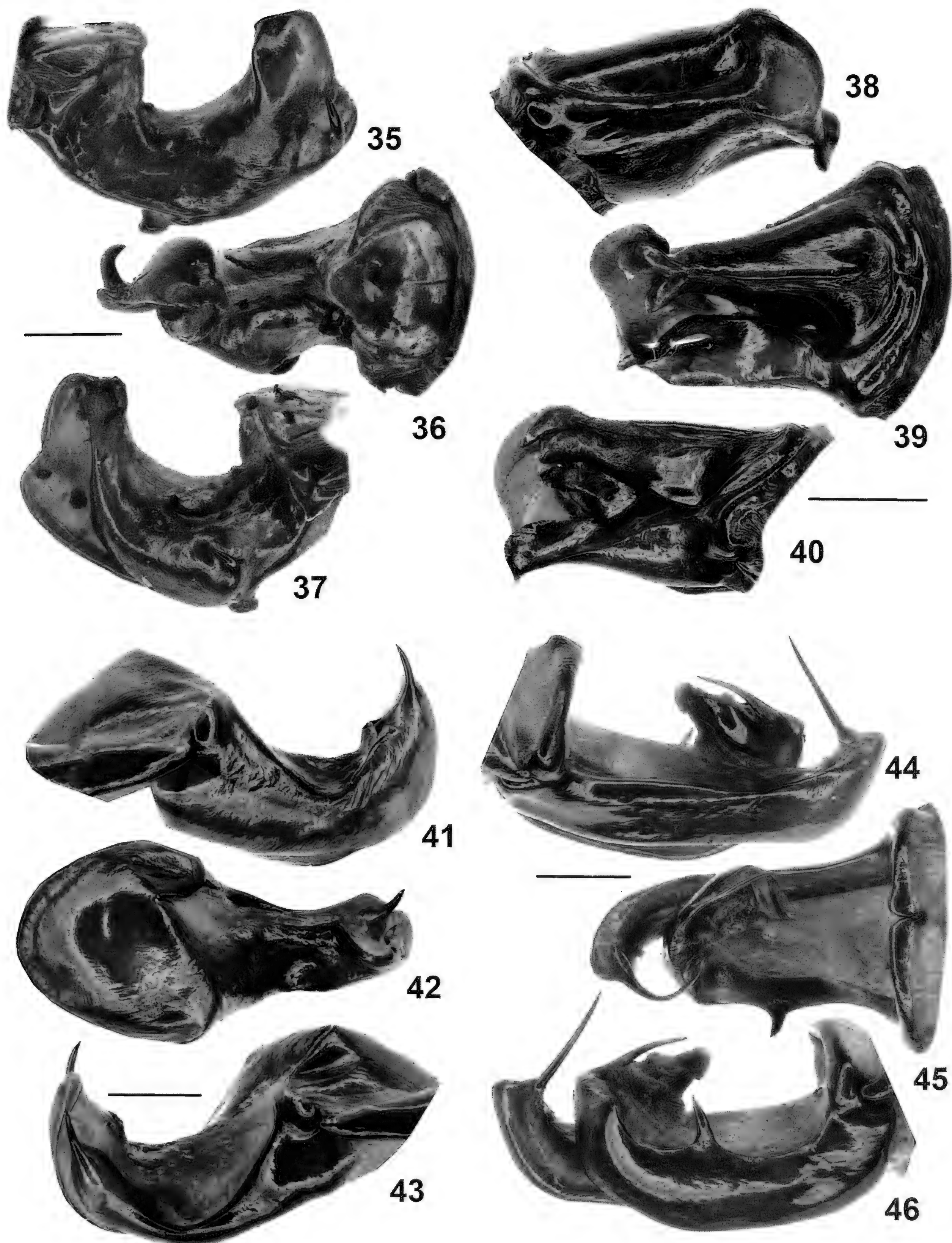
Holotype: MHNG (MHNG-ENTO-81689); 1 ♂; SIKKIM: // Himalaja [sic] / Sikkim // HOLOTYPUS ♂ / *Cyphochilus / satyarthii mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 3 specimens.

SIKKIM: ISNB; 1 ♂; Sikkim; ex coll. Ley. – PCMN; 1 ♂; India, Sikkim east, Gantok, env. 2000-2500 m, Fambong-Lo forest; 8-15.VII.1997; Jan Schneider lgt.

WEST BENGAL: MNHN; 1 ♂; Pedong [Kalimpong]; A. Desgodins; ex coll. R. Oberthur.

Description of the holotype male: *Size* – BL: 18.5 mm, BW: 7.6 mm, BWX: 9.8 mm, situated in the distal third of elytra. *Color* – Integument dark brown while legs and appendices reddish brown; dorsal surface with scales uniformly white cream, more dense along sides of pronotum and margins of elytra. *Head* – CW/L: 2.8; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus gradually rounded posteriad; frons large, making eyes not prominent (F/O: 7.7); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins gently curved, basal angles obtuse and smooth. *Elytra* – Without any stria visible. *Thoracic sterna* – Surface with long, yellowish-brown pubescence and scattered scales; mesosternum well developed anteriorly (MstL: 1.39 mm) between the mesocoxae, pointed and curved dorsally. *Abdomen* – Sternites with sparse scales (the eight sternite is absent in the holotype specimen); pygidium convex with apical margin reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth subequal to middle tooth. *Aedeagus* – Parameres



Figs 35-46. Parameres in right, dorsal, and left view. (35-37) *Cyphochilus satyarthii* n. sp., holotype. (38-40) *C. peninsularis* Arrow, 1938, lectotype. (41-43) *C. flavomarginatus* Frey, 1971, lectotype. (44-46) *C. sansuukyii* n. sp., holotype. — Scale bars = 1 mm.

slightly asymmetric, both curved dorsally (Figs 35, 37; external margin of right paramere with a spur in the distal third (Fig. 35).

Variability: BL: 18-20 mm.

Female: Unknown.

Etymology: Kailash Satyarthi was recipient of the 2014 Nobel Peace Prize, founder of multiple social organizations in favor of children's rights in India, from where the new species of *Cyphochilus* is described.

Type locality: The type specimen was collected in Sikkim, a small state (about 7,000 km²) in northeastern India bordering Tibet, Bhutan, Nepal, and West Bengal. Sikkim is notable for its biodiversity, including alpine and subtropical climates. Several species of Scarabaeoidea are described from material collected in its national park that covers 35% of the state.

Distribution: The species is also known from a locality in West Bengal state of India.

Remarks: *Cyphochilus satyarthii*, *C. candidus*, *C. septentrionalis*, *C. gandhii*, and *C. tenzingyatsoi*, all inhabiting the north East of India, are very close in the external morphology. Consequently, the five species were often confused in the past. *Cyphochilus satyarthii* is recognizable by the shape of parameres: the left paramere unarmed and the right one with an externally directed spur (Fig. 36).

Cyphochilus tenzingyatsoi n. sp.

Figs 29-31

Holotype: MHNG (MHNG-ENTO-81687); 1 ♂; TIBET: // CHINA, E. Tibet, 2050-2400 m / N of Brahmaputra great bend / 30°00'-07° - 94°22'-95°09' [sic] / 16-20.VII.1992, L. & R. Businsky leg. // HOLOTYPE ♂ / *Cyphochilus / tenzingyatsoi mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 8 specimens.

CHINA, TIBET: MHNG; 1 ♂, 1 ♀; same data as holotype. – NMPC; 1 ♂, 1 ♀; same data as holotype; ex coll. D. Král. – PCMN; 2 ♀; CHINA, SE Tibet, Tome-Bomê, 3600 m; 3.VII.1996, leg. V. Paulus. – PCAB; 1 ♂; East Tibet, Tomi (Tangmai), 30 km W. of Donjung, 16.V.2005; 2075 m; leg. A. Wrzecionko. – PCAB; 1 ♂; same data as previous.

Description of the holotype male: Size – BL: 24.3 mm, BW: 10 mm, BWX: 13 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown except for brown-reddish antennal clubs, other appendices and legs; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and subparallel; frons large, making eyes relatively

small, not prominent (F/O: 3.1); antennal club shorter than antennomeres 2-7 (A2-7/CL: 1.1). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex; apical angles and lateral margins flattened, slightly acute and not protuberant; basal lateral margins convex, basal angles largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scattered scales; mesosternum strongly developed anteriorly (MstL: 1.65 mm) between the mesocoxae. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate with the basal tooth small; slender apical tooth much longer than the middle tooth. *Aedeagus* – Parameres strongly asymmetric; left paramere with a long ventral process that wrap the right one, like in *C. gandhii*; apex of the right paramere concave and with a straight margin (Figs 29-31).

Variability: BL: 23.5-25 mm.

Females: BL: 25 mm; antennal club ovate, shorter than preceding antennomeres 2-7 (A2-7/CL: 1.9).

Etymology: Jetsun Jamphel Ngawang Lobsang Yeshe Tenzin Gyatso, formally recognized as the 14th Dalai Lama, was the recipient of the 1989 Nobel Peace Prize for his activity in Tibet, from where the new species is described.

Type locality: The specimens were collected during two Czech expeditions in the Bomê County of Nyingchi City in the southeastern part of the Tibet Autonomous Region of China.

Distribution: *Cyphochilus tenzingyatsoi* is at present known only from two collection sites in the montane areas of southeastern Tibet.

Remarks: This species can be readily separated from all other congeners by its: large body size, elytral striae not elevated, mesosternum armed with a long spur and for the unique shape of the parameres. The morphologically closest species is *C. gandhii* from which it is easily distinguishable by having antennal club shorter than antennomeres 2-7 and the apex of the right paramere concave and with straight apical margin (Figs 29 vs. 23).

Section 1b

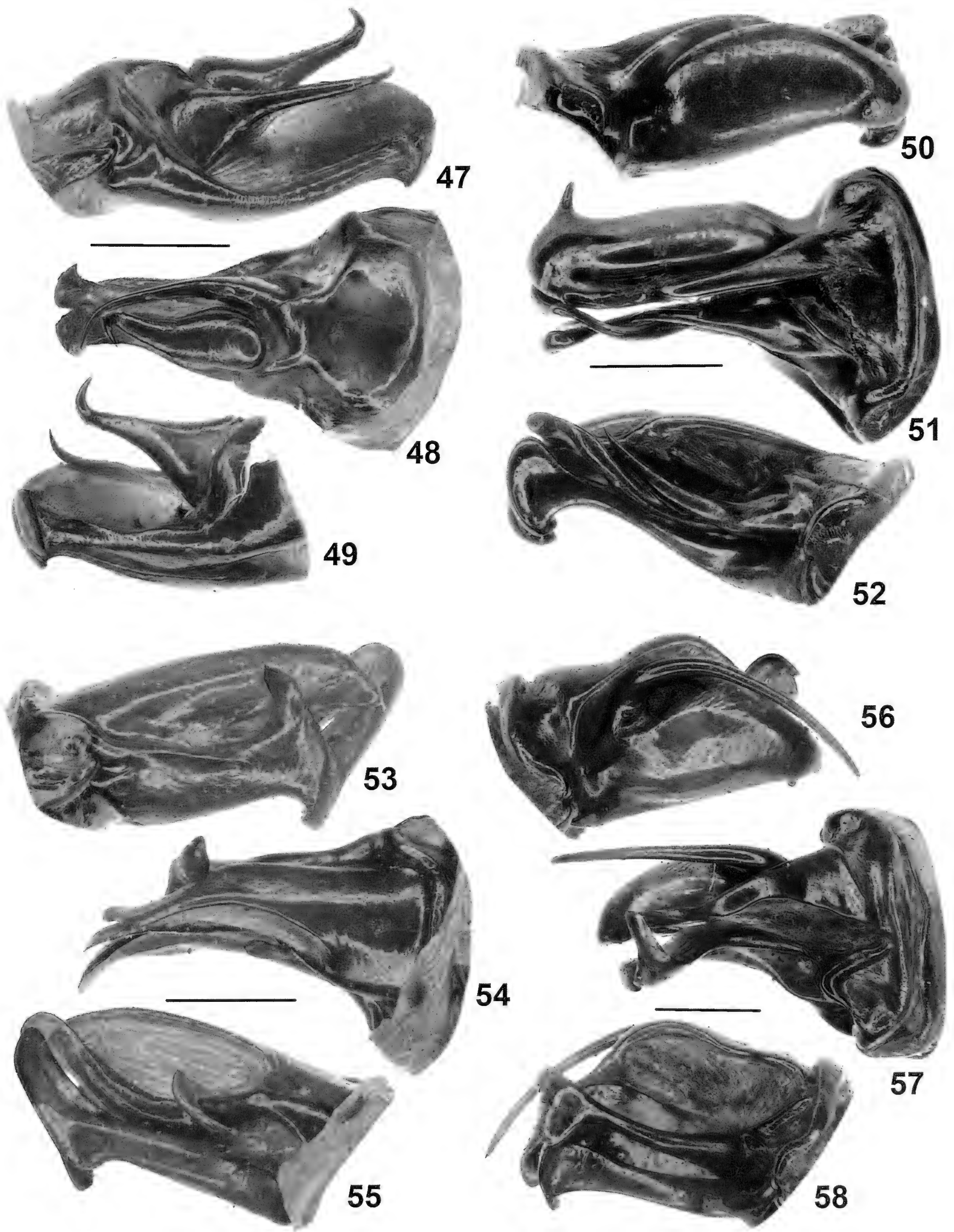
Species with mesosternum armed with a short spur, length in lateral view 0.2-0.6 mm (Fig. 17).

Cyphochilus carinchebanus Brenske, 1903

Figs 47-49, 82

Cyphochilus carinchebanus Brenske, 1903: 381

Type material examined: holotype: ZMHB; 1 ♀; Carin Cheba, 800-1100 m, L. Fea V XII-88.



Figs 47-58. Parameres in right, dorsal, and left view. (47-49) *Cyphochilus carinchebanus* Brenske, 1903. (50-52) *C. obscurus* Sharp, 1876, holotype. (53-55) *C. proximus* Sharp, 1876, holotype. (56-58) *C. tricolor* Waterhouse, 1867, lectotype. — Scale bars = 1 mm.

Material examined: 10 specimens.

MYANMAR: ZMHB; 1 ♂; Carin Cheba, 800-1100 m, L. Fea V XII-88; (Fig. 82).

THAILAND: MHNG; 2 ♂, 7 ♀; North Thailand, Chiang Rai, Wiang Pa Pao; 3.III.1988; leg. F. Ferrero.

Description of male specimen in ZMHB: *Size* – BL: 18.2 mm, BW: 7.1 mm, BWX: 9.3 mm, situated at midpoint of elytra. *Color* – Integument brown with legs, antenna and other appendices light brown; surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.2; clypeus largely rounded (F/O: 4.9) with lateral margins divergent posteriad; antennal club much longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – (PnW/L: 2.2); apical angles and lateral margins flattened; apical angles right and slightly protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.35 mm) however visible in lateral view between the mesocoxae. *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with the apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres slightly asymmetric with two long appendices in addition to the terminal part of parameres (Figs 47-49).

Variability: BL: 16.5-18.5 mm.

Females: Relatively larger than males (7.4-7.6 mm); antennal club ovate, much shorter than preceding antennomeres 2-7 (A2-7/CL: 2).

Type locality: The type locality Carin Cheba corresponds nowadays to Karen Hills (750 m altitude) in Myanmar.

Distribution: The species was described from Karen Hills in Myanmar, one of the main hill ranges in eastern Burma located across the SW corner of Shan State and Kayah State; is also known from the southwestern most district of Chiang Rai Province in northern Thailand.

Remarks: This is a small *Cyphochilus* species and can be readily separated from all other congeners by the unique form of the parameres. Unfortunately, Brenske described this species from a female specimen, however, comparison of recently collected specimens with the type, leave no doubt they are conspecific.

Cyphochilus feae Brenske, 1903

Figs 10, 65-67, 83

Cyphochilus feae Brenske, 1903: 380

Type material examined: Holotype: ZMHB; 1 ♂; MYANMAR: // *Feae* 1092 / Type Brsk (H) //

Carin Cheba / 900-1100 m / L. Fea V XII-88 (P) // coll. Brenske (P) //. (Figs 10, 83).

Addition material examined: 11 specimens.

MYANMAR: ZMHB; 1 ♂; same data as holotype. – MNHN; 1 ♂; same data as holotype. – MSNG; 4 ♂; same data as holotype. – MHNG; 2 ♂; same data as holotype. – PCMN; 3 ♂; SE Myanmar, Dawna; IX.1990.

Redescription of the holotype male: *Size* – BL: 14.5 mm; BW: 6 mm; BWX: 7.3 mm, situated at midpoint of elytra. *Color*. Integument dark shiny brown; dorsal surface with scattered yellow scales not aggregated along lateral part of the body. *Head* – CW/L: 3.6; anterolateral edges of clypeus rounded, lateral edges of clypeus curved and divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 3.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.89). *Pronotum* – Transverse (PnW/L: 2.3), strongly convex; apical angles and lateral margins flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse and largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.24 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth longer than the middle one. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 65-67).

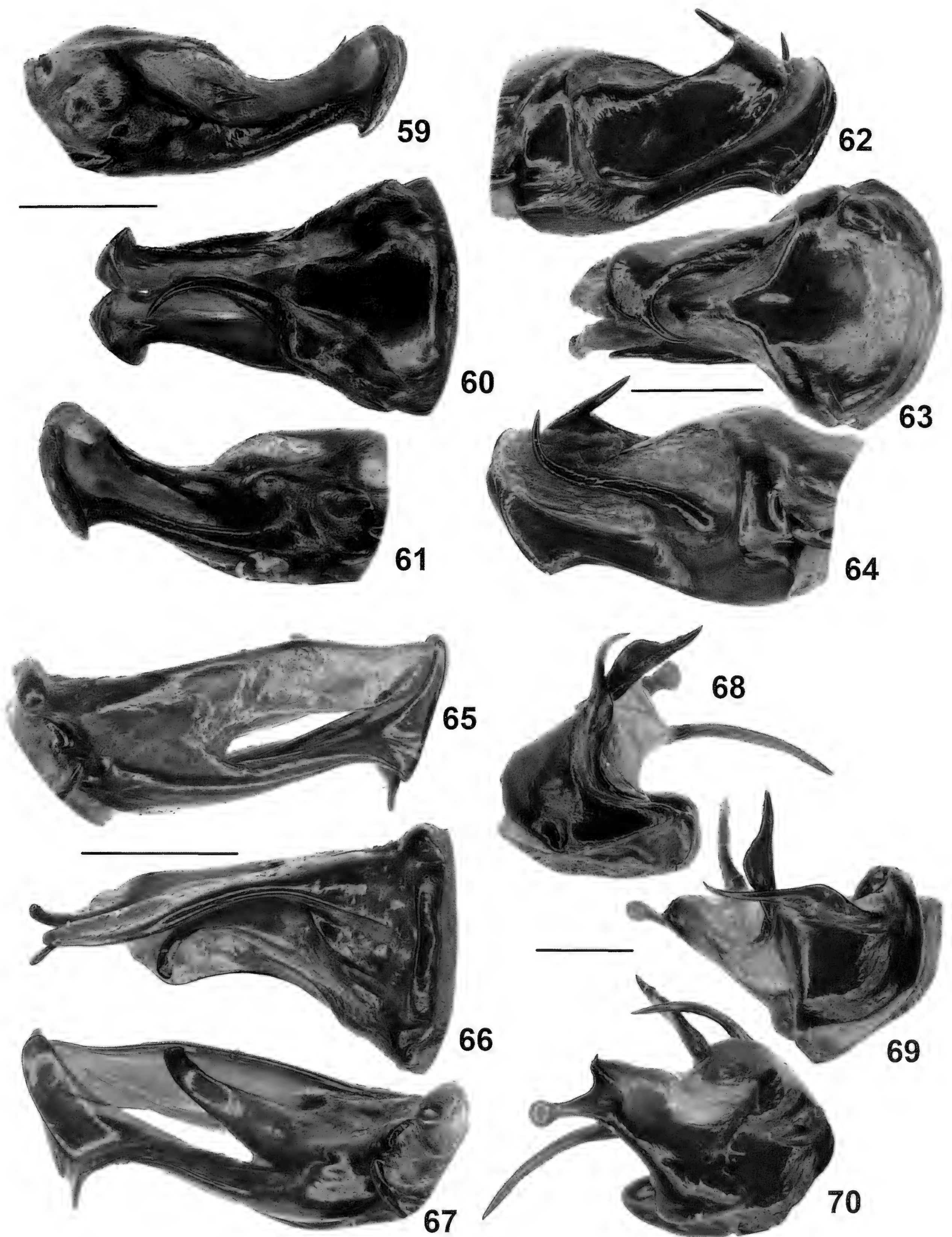
Variability: BL: 7-18 mm. It is possible that the scattered scales on the dorsal part of the body in the specimens examined are a consequence of mechanical wear and that fresh specimens may have a denser covering of scales.

Females: Unknown.

Type locality: The type locality Carin Cheba corresponds nowadays to Karen Hills (750 m altitude) in Myanmar.

Distribution: Apart from Karen Hill, this species is known to me only from one other locality (Dawna Range) also situated in the Kayah State of eastern Myanmar.

Remarks: *Cyphochilus feae*, *C. proximus* and *C. rohingyae* have a similarly shaped parameres with five appendices and they are all known from Myanmar and the Malaysian Peninsula. They can be readily separated from each other mainly by the different conformation of the distal part of the right paramere (Figs 53, 65, 71).



Figs 59-70. Parameres in right, dorsal, and left view. (59-61) *Cyphochilus zuercheri* n. sp., holotype. (62-64) *C. reichenbachii* n. sp., holotype. (65-67) *C. feae* Brenske, 1903, holotype. (68-70) *C. leducthoi* n. sp., holotype. – Scale bars = 1 mm.

***Cyphochilus obscurus* Sharp, 1876**

Figs 4, 50-52, 87

Cyphochilus obscurus Sharp, 1876: 83.

Type material examined: Holotype: MNHN: 1 ♂; LAOS: // *Cyphochilus obscurus* / Laos. Type / D. S. (H) // Laos (H) / Mouhot (P) // Ex Musaeo / D. Sharp 1890 (P) // Muséum Paris / 1952 / Coll. R. Oberthur (P) // Typus (H on red) //. (Figs 4, 87).

Additional material examined: 8 specimens.

LAOS: ISNB; 1 ♂; Paklay; 15.VIII.1917; R. Vitalis de Salv[aza] – ISNB; 1 ♂; Luang Prabang; 27.VIII.1917; R. Vitalis de Salv[aza]. – ISNB; 2 ♂; Laos, Pak. [?]; 24.IX.1919; coll. R. Vitalis de Salv[aza].

THAILAND: PCMN; 2 ♂; Chiang Mai; X.1989. – MHNG; 3 ♂; Nan; VIII.1993. – MHNG; 3 ♂; Wiang Papao, 80 km NE Chiang Mai, 1992.

Redescription of the holotype male: *Size* – BL: 16.4 mm, BW: 7 mm, BWX: 8.7 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales densely aggregated on the sides of pronotum. *Head* – CW/L: 2.6; clypeus largely rounded; (F/O: 3.4); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.8). *Pronotum* – (PnW/L: 2); apical angles and lateral margins largely flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.47 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites only with scattered scales; pygidium convex with apical margin very narrowly reflected. *Legs* – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth; claws of all tarsi bifid at apex. *Aedeagus* – Parameres strongly asymmetric with 5 appendices 50-52; the right paramere in form of club with an apical spike directed externally (Fig. 51).

Variability: BL: 16-17.5 mm. Specimens from Thailand have the vestiture with ochre scales instead of white, however, this is a variation observed also in other species of *Cyphochilus*.

Female: Unknown.

Type locality: The type locality is given as Laos.

Distribution: The species is known from only a few specimens, all from North Laos and North Thailand.

Remarks: Sharp (1876) thought that the holotype of *C. obscurus* was a female, however it is a male. *Cyphochilus obscurus* can be readily separated from all other congeners by the unique form of the parameres. Moreover, the bifid claws are an astonishing character since all other *Cyphochilus* have claws with a thorn in medial position, never bifid. Actually, this is a quite

strong character utilized to separate group of genera in the Rhizotrogini, however, all other characters attribute this species to genus *Cyphochilus* without any doubt.

***Cyphochilus peninsularis* Arrow, 1938**

Figs 14, 38-40, 89

Cyphochilus peninsularis Arrow, 1938: 268.

Type material examined: Lectotype by present designation: BMNH; 1 ♂; THAILAND: // 1937-647 (P) // Type (P circular label, red border) // Peninsular Siam [THAILAND]/ Nakon Sri Tamarat / Kao Luang / 5800 ft / March 30th 1922 / H.M. Pendlebury (P) // *Cyphochilus / peninsularis* / Type ♂ Arrow (H) //. (Fig. 14). – Paralectotype by present designation: BMNH; 1 ♀; //1937-647 // *Cyphochilus / peninsularis* / Co-type ♀ Arrow (H) // Peninsular Siam / Nakon Sri Tamarat / Kao Luang / 5800 ft / March 30th 1922 / H.M. Pendlebury (P) // 1937-647 (P) //. – Paralectotype by present designation: BMNH; 1 ♂; // Co-type (P circular label, yellow border // March 29th 1922 / H.M. Pendlebury (P) // Peninsular Siam / Nakon Sri Tamarat / Kao Luang / 5800 ft // March 24th 1922 / H.M. Pendlebury (P) // 1938-437 (P) //. – Paralectotype by present designation: MHNG; 1 ♂; // Peninsular Siam / Nakon Sri Tamarat / 9 m Kao Luang / 5800 ft / March 29th 1922 / H.M. Pendlebury (P) // 1937-437 (P) //. (Fig. 89).

Redescription of the lectotype male: *Size* – BL: 20.8 mm, BW: 8.7 mm, BWX: 11 mm, situated in the distal third of elytra. *Color* – Integument dark brown while legs and appendices light brown-reddish; dorsal surface with scales uniformly whitish, denser along sides of pronotum and margins of elytra where they are yellowish. *Head* – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and subparallel; frons large, making eyes not prominent (F/O: 4.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – Transverse (PnW/L: 1.8), strongly convex, slightly concave just behind eyes; apical angles flattened, acute and protuberant; basal lateral margins sinuate, basal angles acute and sharp. *Elytra* – With four striae visible, not covered by scales but not elevated. *Thoracic sterna* – Surface with long, yellowish-brown pubescence and scales; mesosternum developed anteriorly (MstL: 0.65 mm) visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales including median part of the eight sternite; pygidium convex with apical margin largely reflected and with corresponding ventrite quite large. *Legs* – Protibia bidentate being the third basal tooth almost not visible; slender apical tooth much longer than the middle tooth. *Aedeagus* – Parameres strongly asymmetric (Figs 38-40).

Variability: BL: 20.5-22.7 mm.

Female: Antennal club ovate, much shorter than in the males and of preceding antennomeres (A2-7/CL: 1.5).

Type locality: Nakhon Sri Thammarat is a city in southern Thailand (8°26'11"N, 99°57'47"E), capital of the homonymous Province and District. The locality is about 610 km South of Bangkok, on the east coast of the Malay Peninsula.

Distribution: The species is known only from one locality in the Southern Thailand on the Malay Peninsula.

Remarks: Arrows (1938) described the species based on 8 specimens, of which only 5 could be found. *Cyphochilus peninsularis* is quite distinct morphologically from its congeners. It is easily recognizable by the long antennal club in the males, the mesosternum developed between mesocoxae and by the unique morphology of the parameres.

Cyphochilus proximus Sharp, 1876

Figs 5, 7, 17, 53-55

Cyphochilus proximus Sharp, 1876: 83.

Cyphochilus cylindricus Brenske, 1903: 381. **new synonym**

C. proximus type material examined: Holotype: MNHN: 1 ♂; MYANMAR: // *Cyphochilus proximus* / Burmah Type / D. S. (H) // Burmah (H) // Ex Musaeo / D. Sharp (P black border) // Muséum Paris / 1952 / Coll. R. Oberthur (P) // Typus (H on red) // (Fig. 5).

C. cylindricus type material examined: Lectotype by present designation: ZMHB: 1 ♀; // *Cyph. cylindricus* / Type Brsk / 1093 (H) // India or. / Speyer (H) // Coll. Brenske (P) //. (Fig. 7). – Paralectotype by present designation: ZMHB: ♂; // *Cyph. cylindricus* / Type Brsk / 1093 (H on white) // India or. / Speyer (H on white) // Coll. Brenske (P) //.

Additional material examined: 74 specimens.

MYANMAR: BMNH; 1 ♂; Burma. – BMNH; 3 ♂; Birmanie, Theinzeik; P. Lofzeau, 1913. – ISNB; 5 ♂, 10 ♀; same data as previous. – ZMHB; 4 ♂, 20 ♀; same data as previous. – MHNG; 3 ♂, 5 ♀; same data as previous. – HNHM; 15 ♀; same data as previous.

EAST INDIES (generic): MTD; 8 ♀; Ind. Or. [= Indes Orientales, East Indies].

Redescription of the holotype male: *Size* – BL: 17.4 mm, BW: 7.5 mm, BWX: 9 mm, situated at midpoint of elytra. *Color* – Integument light brown; dorsal surface with yellowish scales not aggregated along sides of pronotum and margins of elytra. *Head* – CW/L: 3.1; clypeus with frontal margin straight and lateral convergent; (F/O: 3.6); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – (PnW/L: 1.9); apical angles and lateral margins flattened, apical angles right and slightly protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without

any visible striae. *Thoracic sterna* – Surface with scales and sparse short white hairs; mesosternum feebly developed (MstL: 0.56 mm) however, visible in lateral view between the mesocoxae (Fig. 17). *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with basal tooth vestigial; slender apical tooth as long as middle tooth. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 53-55).

Variability: BL: 16.5-19 mm. All the males collected in Theinzeik have, in contrast to the type, the antennal club shorter than antennomeres 2-7; however, the parameres have same shape and I consider, for the time being, these specimens conspecific.

Females: BL: 16.5-21 mm; antennal club ovoid, shorter than preceding antennomeres (A2-7/CL: 1.7); generally in the females the scales are white while in males the scales are generally yellowish.

Type locality: The type locality is given as Burma, presently Myanmar.

Distribution: Apart from the type locality, a long series of specimens was collected in Theinzeik, situated (17°4'N, 97°18'E) in Thaton District of the Mon State in southern Myanmar Tenasserim plains.

Remarks: Sharp (1876) thought that the holotype of *Cyphochilus proximus* he described was a female, however it is a male. In the original description of *C. cylindricus* Brenske mentioned only a single female specimen, however, the ZMHB holds two specimens and both labeled as type. I therefore designated as lectotype the female specimen, and the male specimen, despite this is not mentioned in the description, as paralectotype. Moreover, the comparison of the type series shows that *C. cylindricus* is a junior synonym of *C. proximus* that can be readily separated from all other congeners by the unique form of the parameres (Figs 53-55).

Cyphochilus tricolor Waterhouse, 1867

Figs 11, 12, 56-58

Cyphochilus tricolor Waterhouse, 1867: 142.

Cyphochilus vestitus Sharp, 1876: 82. **new synonym**

C. tricolor type material examined: Lectotype by present designation: BMNH; 1 ♂; SIAM: // *C. tricolor*, Waterh. Type (H) // Siam (H) // Type (P on white with red border) // Bowring. 63'47* (P on white) //. (Fig. 12).

C. vestitus type material examined: Holotype: MNHN; 1 ♂; // *Cyphochilus vestitus* / Cambodia Type / D. S. (H on red) // Camb (H) / Mouhot (P) // Ex Musaeo / D. Sharp 1890 (P on white) // Muséum Paris / Coll. R. Oberthur (P on white) // Typus (H on red) //. (Fig. 11).

Additional material examined: 2 specimens.

CAMBODIA: MSNG; 1 ♂; Cambodia.

LAOS: ISNB; 1 ♂; Takek; ex coll. Le Moul. t.

Description of the lectotype male: *Size* – BL: 13.5 mm, BW: 5.8 mm, BWX: 7.5 mm, situated at midpoint of elytra. *Color* – Integument light brown; dorsal surface with scales densely aggregated along sides of pronotum and margins of elytra; scales are white on discus, ochre on head, sides of pronotum and of elytra and yellowish on the margins of elytra. *Head* – CW/L: 3.2; clypeus largely rounded; (F/O: 5.7); antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.1). *Pronotum* – (PnW/L: 2); apical angles and lateral margins flattened, apical angles right and protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.45 mm) however visible between mesocoxae in lateral view. *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with basal tooth vestigial; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 56-58).

Variability: BL: 13-14.5 mm.

Females: Unknown.

Type locality: The type locality given on the labels of the lectotype is “Siam”, an old geographical name referable to the territories of Thailand and Cambodia.

Distribution: This species is known from three specimens with generic collection data: Thailand, Cambodia and Laos, the most precise locality being Thakhek in Laos at the border with Thailand (17°24'N 104°48'E).

Remarks: Although it seems that Waterhouse described *C. tricolor* on a single specimen this is unfortunately not explicitly stated. Therefore, I prefer to designate the only available type specimen as the lectotype. *Cyphochilus vestitus* Sharp was explicitly described based on a single specimen, which is hence the holotype. The comparison of these types shows that *C. vestitus* is a junior synonym of *C. tricolor*. The species can be readily separated from all other congeners by the unique conformation of the strongly asymmetric parameres with five appendices (Figs 56-58).

***Cyphochilus hmong* n. sp.**

Figs 21, 74-76

Holotype: MHNG (MHNG-ENTO-81700); 1 ♂; LAOS: // N. [North] Laos, 10.V.97, Louang /

Namtha, leg. M. Strba & / R. Hergovitz (P on yellow // // HOLOTYPUS ♂ / *Cyphochilus / hmong mihi* / G. Sabatinelli, 2020 (T on red) //.

Description of the holotype male: *Size* – BL: 18.4 mm, BW: 6.6 mm, BWX: 8.4 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.4; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 5.3); frons concave; antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7) (Fig. 21). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles and lateral margins largely flattened, apical angles right not protuberant; basal lateral margins straight, basal angles largely rounded. *Elytra* – Without visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.23 mm) however visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres slightly asymmetric with two apical appendices in addition to the terminal parts of parameres (Figs 74-76).

Etymology: Dedicated to the Hmong people, one of the largest ethnic minority in Laos and presently living in the jungle to escape persecutions.

Type locality: Louang Namtha is the capital of the homonymous Province in northern Laos bordering with Yunnan to the north and Burma to the northwest.

Distribution: The species is known only from one locality in the extreme northwest portion of Laos.

Remarks: *Cyphochilus hmong* can be readily separated from all other congeners by the unique form of the parameres with two apical appendices in addition to the terminal parts.

***Cyphochilus leduthoi* n. sp.**

Figs 68-70, 85

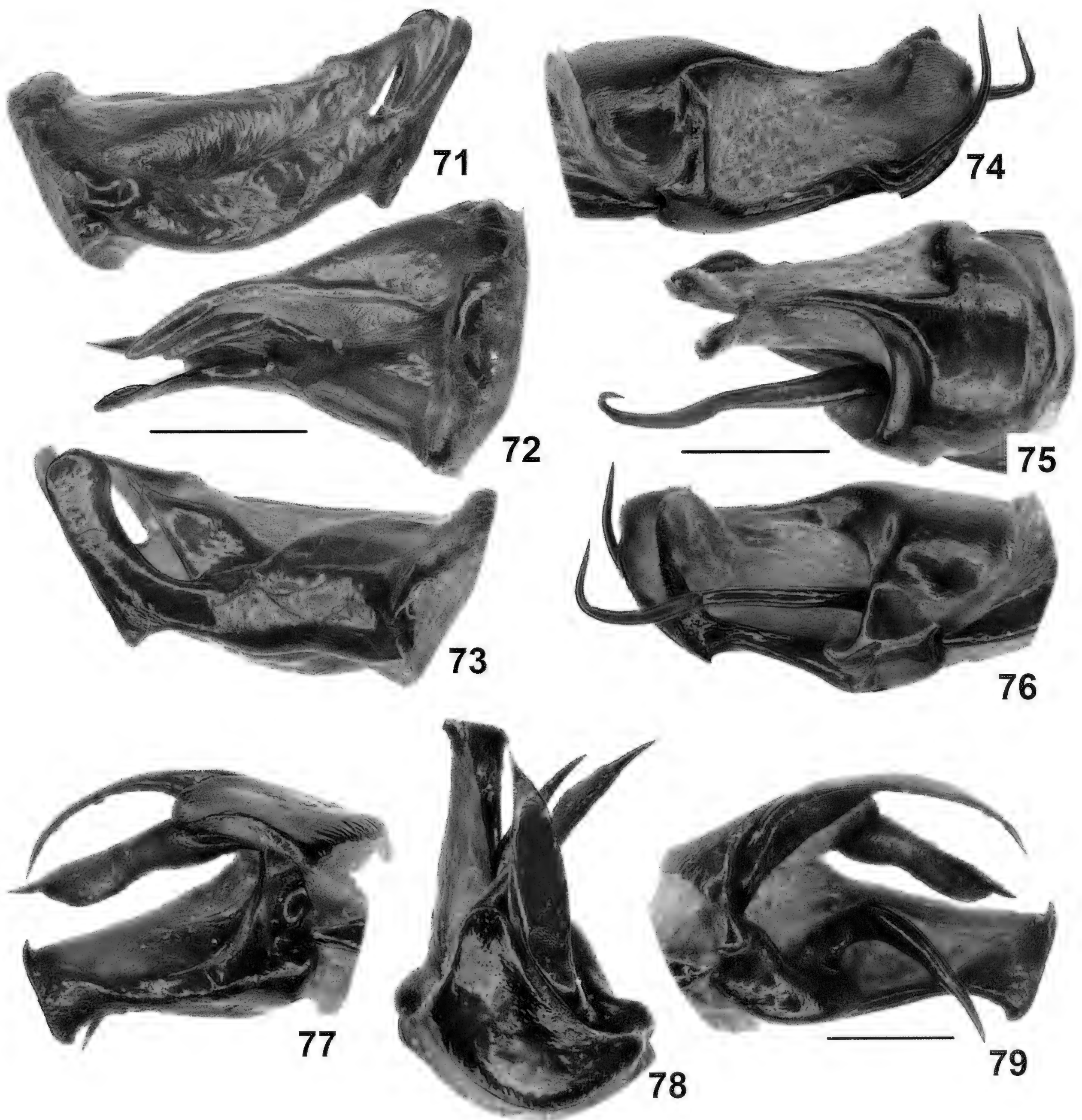
Holotype: MHNG (MHNG-ENTO-81695); 1 ♂, VIETNAM: // North VIETNAM / Tam Dao / 10-20.V.1993 (P) // HOLOTYPUS ♂ / *Cyphochilus / leduthoi mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 85).

Paratype: 18 specimens.

VIETNAM: PCAR; 1 ♂; N. Vietnam, Tam Dao, 400-900 m; 18.IV.2012; leg. Hoa Binh. – MHNG; 8 ♂, 8 ♀; same locality than previous, 29.IV.1991; leg. M. Fujoka & R. Muramoto. – MHNB; 5 ♂; N. Vietnam, Tam Dao, Vinh Phu Prov., 20-28.VI.1990; leg. Jan Strnad.

Description of the holotype male: *Size* – BL: 20 mm, BW: 8.3 mm, BWX: 11.2 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 5.5); frons concave; antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.2). *Pronotum* – Transverse (PnW/L: 2.2), strongly

convex; apical angles and lateral margins narrowly flattened, apical angles right, not protuberant; basal lateral margins curved, basal angles largely rounded. *Elytra* – With striae slightly visible among the scales but not elevated. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.35 mm) however, visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin



Figs 71-79. Parameres in right, dorsal, and left view. (71-73) *Cyphochilus rohingyae* n. sp., holotype. (74-76) *C. hmong* n. sp., holotype. (77-79) *C. orbachi* n. sp., holotype. – Scale bars = 1 mm.

narrowly reflected. *Legs* – Protibiae tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 68-70).

Variability: BL: 18-22.5 mm ($x = 19.8$, $n = 17$).

Females: BL: 19-22.5 mm, BW: 8.7 mm, BWX: 11.5 mm; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Le Đức Thọ was a Vietnamese general, diplomat, politician, and awardee (but refused to accept) of the 1973 Nobel Peace Prize, for his efforts in negotiating between the U.S.A. and Vietnam, the country from where the new species of *Cyphochilus* is described.

Type locality: Tam Dao National Park is a protected area in North Vietnam, about 85 km northwest of Hanoi. Its exact location is at 21°21' to 21°42' North latitude, 105°23' to 105°44' East longitude.

Distribution: *Cyphochilus leducthoi* is known only from specimens collected in Tam Dao. The National Park is based in the Tam Dao range, which is one of the terminal spurs of a larger mountainous area in the Northwest region of Vietnam; it runs 80 km from northwest to south east with altitudes of over 1000 m.

Remarks: This species is morphologically close to *C. orbachi* n. sp. having small body size, elytral striae slightly visible, mesosternum slightly developed and parameres with four appendices. The two species can be readily separated from all other congeners and from each other by the unique form of the parameres strongly asymmetric with four appendices (Figs 68-70).

Cyphochilus orbachi n. sp.

Figs 77-79

Holotype: MHNG (MHNG-ENTO-81696); 1 ♂; VIETNAM: // N. Vietnam, Xuat Hoa / Bac Kan, 22°04.18' N, 105°52.51' E, 336 m / IV.2015; Hoa Binh leg. (P on yellow) // HOLOTYPUS ♂ / *Cyphochilus orbachi mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 16 specimens.

VIETNAM: MHNG; 1 ♂; Tonkin, Baokan; Lemee 1908. – PCAR; 2 ♂; N. Vietnam, Tam Dao, 950 m; 25-28.III.2004; leg. Hoa Binh & Th. Frederking. – MZUF; 1 ♂; Vietnam, Bac Kan prov., Ba Be distr., Ba Be nat. park, 350 m; 8.VI.2011; leg. E. Orbach. – MHNG; 1 ♂; same previous data. – MHNG; 1 ♀; N. Vietnam, Tai Nguyen Prov., Mo Ba, 450 m; 15.V.2012; leg. Hoa Binh. – MHNG; 1 ♂; N. Vietnam, Lao Cai, Taphin, Kreis Sapa; VII-VIII.2011; leg. Hoa Binh. – PCAR; 1 ♂; same data as previous. – MHNG; 1 ♂; N. Vietnam, Xuat Hoa, NE Tam Dao; VII.2012; leg. Hoa Binh. – MHNG; 3 ♂; N. Vietnam, Xuat Hoa, Bac Kan, 22°04.18' N 105°52.51' E,

336 m; IV.2015; leg. Hoa Binh. – PCAR; 4 ♂; same data as previous.

Description of the holotype male: *Size* – BL: 19.3 mm, BW: 8 mm, BWX: 11.2 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white-cream scales not aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 3.7); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2), strongly convex; apical angles and lateral margins narrowly flattened, apical angles right not protuberant; basal lateral margins curved, basal angles largely rounded. *Elytra* – With striae slightly visible among scales, not elevated. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.23 mm) but visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with 4 appendices (Figs 77-79).

Variability: BL: 18-20 mm ($x = 19.7$, $n = 16$).

Females: BL: 19.3 mm, BW: 8 mm, BWX: 11.2 mm, antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5)

Etymology: Eylon Orbach is an Israeli entomologist who collected this new species during some of the expeditions in Vietnam he took part.

Type locality: Bac Kan is a Province in the Northeast part of Vietnam about 240 kilometers northwest of the capital city Hanoi.

Distribution: *Cyphochilus orbachi* is known only from several localities all in the north portion of Vietnam. The holotype and one paratype were collected recently, during an expedition of the Natural History Museum of Florence (Italy), in the Ba Be National Park. The park (about 100 km²) is located in a hilly and mountainous area, surrounded with rivers, set up to protect the Ba Be Lake along with surrounding limestone and lowland evergreen forests.

Remarks: This species is close morphologically to *C. leducthoi* n. sp., having small body size, elytral striae slightly visible, mesosternum slightly developed and parameres with four appendices. The two species can be readily separated from all other congeners and from each other by the unique form of the parameres.

***Cyphochilus reichenbachii* n. sp.**

Figs 62-64

Holotype: MHNG (MHNG-ENTO-81701); 1 ♂; VIETNAM: // North Vietnam, Tam Dao / Vinh huc prov. 1010 m / 21°27.588' N, 105°38.475 E / IV.2014, leg. Hoa Binh (P) // HOLOTYPUS ♂ / *Cyphochilus reichenbachii mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 32 specimens.

VIETNAM: MHNG; 1 ♂; Tonkin; ach. Baudet. – PCAR; 1 ♂; same data as holotype. – PCAR; 1 ♂; North Vietnam, Tam Dao, 400-900 m; VI-VII.2012; leg. Hoa Binh Nguyen. – PCAR; 2 ♂; North Vietnam, Tam Dao, 400-900 m; 18.VI.2012; leg. Hoa Binh Nguyen. – MHNG; 10 ♂, 1 ♀; North Vietnam, Ta Phin 10 km NNW Sapa, ca. 1700 m; III.2012; leg. Binh Nguen. – PCAR; 15 ♂; same data as previous. – PCDK, 1 ♂, Ha Giang.

Description of the holotype male: *Size* – BL: 19.6 mm, BW: 8.3 mm, BWX: 10.9 mm, situated at midpoint of elytra. *Color.* Integument dark shiny brown; dorsal surface with scattered yellow scales aggregated along lateral part of the body. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved and divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 4.7); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.86). *Pronotum* – Transverse (PnW/L: 2), strongly convex; apical angles and lateral margins flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse and largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.64 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth longer than the middle one. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 62-64).

Variability: BL: 18.5-20.5 mm ($x = 19.5$, $n = 30$).

Females: BL: 18 mm, BW: 7.5 mm, BWX: 10.5 mm; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Andreas Reichenbach (Leipzig, Germany) is a scarabeologist and he provided me with several *Cyphochilus* specimens for study, among them the new species here described.

Distribution: This species is known from several localities in northern part of Vietnam.

Remarks: *Cyphochilus reichenbachii* can be readily separated from all other congeners by the unique shape of the parameres strongly asymmetric with four appendices.

***Cyphochilus rohingyae* n. sp.**

Figs 71-73, 90-91

Holotype: MHNG (MHNG-ENTO-81702); 1 ♂; MALAYASIA: // W. Malaysia, Pahang / Frasier's Hill, ca 1300 m / 17-21.III.1993, light trap / Löbl & Calame, #14 (P) // HOLOTYPUS ♂ / *Cyphochilus rohingyae mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 90).

Paratypes: 57 specimens.

MALAYSIA: MHNG; 27 ♂, 16 ♀; Malaysia, Perak State, Taiping; II.1982. – MHNG; 2 ♂, 2 ♀; Malaysia Peninsula, Pahang, Frasier's Hill, 1300 m; 22.III.-1.IV.2013; leg. Azarov. – MHNG; 2 ♂; West Malaysia, Perak, Taiping, Buki Larut (Maxwell Hill); 14.IV.1996; leg. S. Becwar. – ISNB (Fig. 91); 4 ♀; Malaysia, Perak, Taiping; IV.1981. – ZMHB; 3 ♂, 1 ♀; Malaysia, Tenasserim; III.1995; leg. S. Steinke. – PCMN; 3 ♂; Malaysia, Bukit Fraser, 1-5.V.2003; leg B. Mkovský. – PCDK; 1 ♂, Cameron Highlands.

Description of the holotype male: *Size* – BL: 17.8 mm, BW: 6.9 mm, BWX: 9.2.4 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown; dorsal surface with white-silver scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.2; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 4.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 1.7). *Pronotum* – Transverse (PnW/L: 1.9), strongly convex; apical angles and lateral margins flattened, apical angles acute and protuberant; basal lateral margins straight, basal angles obtuse and smooth. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.27 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia bidentate; slender apical tooth longer than the basal tooth. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 71-73); the two appendices on the right paramere merged for most of their length.

Variability: BL in males: 15.8-19.2 mm ($x = 17.7$, $n = 34$). *Cyphochilus rohingyae* shows a great variability in the color of scales in males and a strong sexual dimorphism (see below). While the holotype and 52% of male specimens have the integument with white-silver scales (Fig. 90), in the other 48% of specimens the scales are yellow-ochre. Some of specimens with yellow-ochre scales have humeri and scutellum with patches of white scales (Fig. 91).

Females: The females are substantially larger than the males: BL: 19-21.5 mm ($x = 19.5$, $n = 23$); antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.6). All female specimens have dorsal cover of uniform white-silver scales.

Etymology: Dedicated to the Rohingya people, an indigenous ethnic group of western Myanmar who were forced to flee in the recent years to Bangladesh, Malaysia, and Thailand.

Type locality: Fraser's Hill (in Malay: Bukit Fraser) is a hill resort located on the Titiwangsa Ridge in Raub District of Pahang State in West Malaysia; the resort is situated 64.6 miles (104 km) from the national capital city Kuala Lumpur.

Distribution: *Cyphochilus rohingyae* is known from the Pahang and Perak States of Western Malaysia on the west coast of the Malay Peninsula. A large series of specimens was collected in Taiping, the wettest location in Peninsular Malaysia where the high rainfall (ca 4000 mm) has led to a profuse flora and century-old rainforest trees.

Remarks: *Cyphochilus rohingyae*, *C. feae* and *C. proximus* have similar conformation of parameres and they are present in Myanmar and Malaysian Peninsula. They can be readily separated mainly by the different shape of the apical part of the right paramere (Figs 65, 53, 71)

***Cyphochilus zuercheri* n. sp.**

Figs 59-61

Holotype: MHNG (MHNG-ENTO-81699); 1 ♂; THAILAND: // North Thailand / Doi Pui, Chiang Mai / 8.V.1988, leg. F. Ferrero (P) // HOLOTYPUS ♂ / *Cyphochilus* / *zuercheri mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 42 specimens.

THAILAND: NHMB; 14 ♂, 15 ♀; NE Thailand, Mae Hong Son, Ban Huai Po, 800-1600 m; 1-15.[?].1991; leg. S. Bily. – PCMN; 1 ♂, 1 ♀; N Thailand, Chiang Mai Prov., Ban Sampakia, 1400 m; 1-19.V.1998; leg. Ivo Martinů. – MHNG; 1 ♂, 1 ♀; North Thailand, Chiang Mai, 1985; leg. N. Koyama. – MHNG, 2 ♂, 1 ♀; Doi Suthep, V.1985, leg. N. Koyama. – NMPC; 1 ♂, 1 ♀; NW Thailand; Mae Hong Son env., Ban Huai Po, 1800 m; 30.IV.-14.V.1991; leg. Frank Farkač. – NHMB; 1 ♂; same data as previous. – NMPC; 1 ♂, 3 ♀; NW Thailand; Mae Hong Son env., Ban Huai Po, 1600-2000 m; 30.IV.-4.V.1991; leg. J. Horác. – NMPC; 2 ♂, 1 ♀; N Thailand, Chiang Dao, Ban San Pakia, 1200 m; 5-10.V.2004; leg. Sv. Bily. – NMPC; 1 ♂; Central Thailand, PKK Prov., Hua Hin; 13-15.V.2004; leg. Sv. Bily.

MYANMAR: BMNH; 1 ♂; Maymyo [Mandalay: Pyin Oo Lwin]; leg. H. L. Andrewes.

Description of the holotype male: Size – BL: 18.6 mm, BW: 7.2 mm, BWX: 9.6 mm, situated at midpoint of elytra. Color. Integument dark shiny brown; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. Head – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral

edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 4.3); antennal club, slightly longer than antennomeres 2-7 (A2-7/CL: 0.6). Pronotum – Transverse (PnW/L: 2.2), strongly convex; apical and lateral angles obtuse. Elytra – Without any visible striae. Thoracic sterna – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.65 mm) however visible between the mesocoxae in lateral view. Abdomen – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin reflected. Legs – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth. Aedeagus – Parameres slightly asymmetric, relatively simple in the morphology compared to other *Cyphochilus* (Figs 59-61); the left paramere with a short dorsal process.

Variability: BL: 17-20.5 mm ($x = 19.5$, $n = 35$).

Females: BL: 17.5-19 mm; BW: 7.5; BWX: 10.5; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Isabelle Zürcher-Pfander is the Collection Manager of the NHMB who provided some of the specimens of the new species.

Type locality: Doi Pui hill or Doi Suthep (18°48' N, 98°53' E, 800-1000 m) is part of the Thanon Thong Chai Range, the southernmost subrange of the Shan Highland system in northern Thailand, the hill is located 7 km NNW of Chiang Mai, capital of the homonymous province.

Distribution: Thailand and Myanmar. Most of the specimens of *C. zuercheri* were collected in northeast Thailand in the mountain part of the Doi Suthep-Pui National Park (261 km²). The vegetation below 1000 m of altitude is mostly deciduous forest, with evergreen forest above this elevation. However, the distribution of this species, according to available data, spans from Myanmar in the north to Thai part of Malayan Peninsula (Mandalay Region, Hua Hin District of Prachuap Khiri Khan Province) in the south.

Remarks: *Cyphochilus zuercheri* can be readily separated from all other congeners by the unique shape of the parameres relatively simple and without appendices (Figs 59-61).

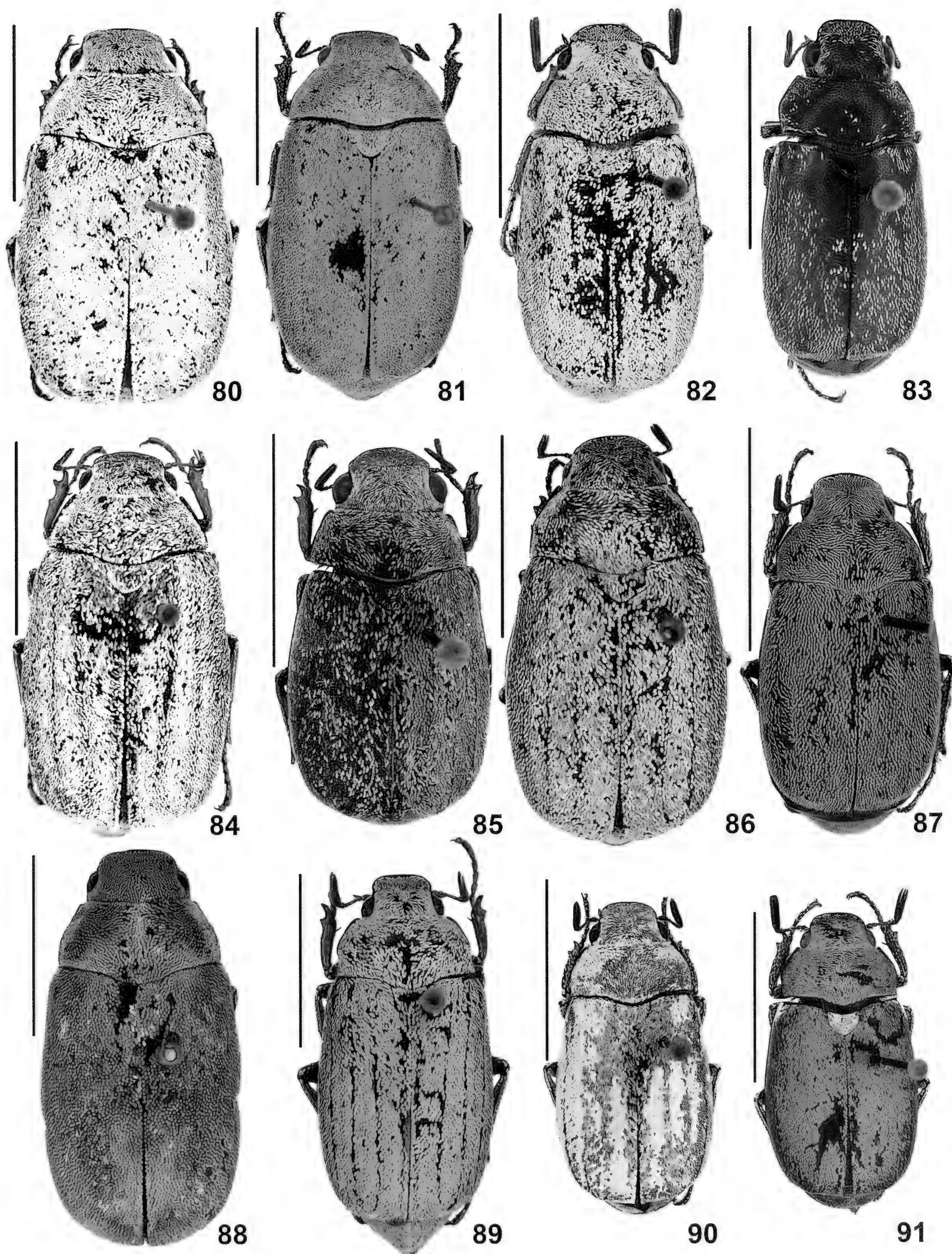
***Cyphochilus* species referable to other genera**

***Dasylepida testaceipes* (Fairmaire, 1902) n. comb.**

Fig. 13

Cyphochilus testaceipes Fairmaire, 1902: 316.

Type material examined: Lectotype by present designation: MNHN; 1 ♀; CHINA: // *Cyphochilus* / *testaceipes* / Fairm China (H) // Foucheou [Fujan: Fou-



Figs 80-91. Habitus. (80) *Cyphochilus candidus* (Olivier, 1789), lectotype ♂ MNHN. (81) *C. candidus* (Olivier, 1789), Nepal: Godavari, ♂ MHNG, yellow scales aberration. (82) *C. carinchebanus* Brenske, 1903, Myanmar: Carin Cheba, ♂ ZMHB. (83) *C. feae* Brenske, 1903, holotype ZMHB. (84) *C. gandhii* n. sp., holotype MHNG. (85) *C. leducthoi* n. sp., holotype MHNG. (86) *C. septentrionalis* Waterhouse, 1867, lectotype BMNH. (87) *C. obscurus* Sharp, 1876, holotype MNHN. (88) *C. sansuukyii* n. sp., paratype ♀ MHNG. (89) *C. peninsularis* Arrow, 1938, paralectotype ♂ MHNG. (90) *C. rohingyae* n. sp., holotype MHNG. (91) *C. rohingyae* n. sp., paratype ♂ MHNG, Malaysia: Perak, bicolor aberration. – Scale bars = 5 mm.

Tcheou] (H) // Type (P on red) // Muséum Paris / 1906 / coll. Leon Fairmaire //. (Fig. 13).

Remarks: The type specimen has a symmetrically bilobed clypeus and the body has very few scales and several setae. Therefore, it does not belong to genus *Cyphochilus* but to genus *Dasylepida* Moser, 1913. *Dasylepida testaceipes* is probably a synonym of one of the species described from east China but this needs to be further investigated.

Updated checklist of all known *Cyphochilus* species

apicalis Waterhouse, 1867 – China
candidus (Olivier, 1789, sub *Melolontha*) – “India or.”; Nepal; India: Sikkim, West Bengal, Assam, Meghalaya, Manipur; Myanmar
carinchebanus Brenske, 1903 – Myanmar
costulatus Bates, 1891 – China: Sichuan
crataceus crataceus (Nijima & Matsumura, 1923, sub *Lepidiota*) in Nijima & Kinoshita, 1923 – Taiwan; syn. *C. miwai* Nakabayashi, 1939
crataceus taipeiensis Kobayashi & Yu, 1993 – Taiwan
elongatus Brenske, 1894 – China: Jiujiang
farinosus Waterhouse, 1867 – “North China”
feae Brenske, 1903 – Myanmar
flavomarginatus Frey, 1971 – Laos
gandhii n. sp. – India: West Bengal, Sikkim, Assam, Arunachal Pradesh
hmong n. sp. – Laos
insulanus Moser, 1918 – Taiwan
latus Arrow, 1941 – Myanmar
leducthoi n. sp. – Vietnam
manipurensis Nonfried, 1893 – India: Manipur
marginalis Fairmaire, 1902 – China: Jiangxi
niveosquamosus (Blanchard, 1850) – India: Karnataka
oberthueri Brenske, 1903 – India: Tamil Nadu
obscurus Sharp, 1876 – Thailand, Laos
ochraceus Moser, 1915 – China: Shandong
orbachi n. sp. – Vietnam
peninsularis Arrow, 1938 – Thailand
podicalis Moser, 1908 – Vietnam
proximus Sharp, 1876 – Myanmar, syn. *C. cylindricus* Brenske, 1903
reichenbachii n. sp. – Vietnam
rohingyae n. sp. – Malaysia
sansuukyii n. sp. – Myanmar
satyarthii n. sp. – India: Sikkim, West Bengal
septentrionalis Waterhouse, 1867 – India: Uttar Pradesh, Sikkim, Assam; Meghalaya, West Bengal, Nagaland; Bangladesh; Nepal (?); syn. *pygidialis* Nonfried, 1893
tenzingyatsoi n. sp. – China: Tibet
tonkinensis Brenske, 1903 – Vietnam
tricolor Waterhouse, 1867 – Thailand, Laos; Cambodia
 syn. *C. vestitus* Sharp, 1876
unidentatus Nomura, 1977 – Taiwan

ventriglaber Brenske, 1903 – Vietnam

ventritectus Brenske, 1903 – Vietnam;

syn. *C. ochraceosquamosus* Moser, 1908

waterhousei Brenske, 1903 – “South India”

zuercheri n. sp. – Thailand; Myanmar

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An annotated list of the millipede (Diplopoda) species described by Johann Carl

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Abstract: Johann Carl described 390 species or subspecies of millipedes during his long career at the Muséum d'histoire naturelle de Genève, studying specimens collected on his own expeditions and on those of other, mainly Swiss, naturalists. The type specimens deposited in Geneva are enumerated, and the type specimens that could be located in other collections in other museums are reported. Lectotypes are designated for 17 species: *Brachyspirobolus aequatorialis* (Carl, 1909), *Carlopeltis alatus* (Carl, 1914), *Mastigorhacus alatus* (Carl, 1912), *Salpidobolus annulipes* (Carl, 1912), *Erythrachus arietis* (Carl, 1912), *Argentocricus bernardinensis* (Carl, 1918), *Trigoniulus bitaeniatus* Carl, 1912, *Desmocricus conjunctus* Carl, 1918, *Polylepis elberti* Carl, 1912, *Trigoniulus incommodus* Carl, 1912, *Stenobolus insularis* Carl, 1918, *Salpidobolus lateralis* (Carl, 1912), *Dinematocricus lombokensis* (Carl, 1912), *Prepodesmus longipes* (Carl, 1913), *Arostrophus mertoni* (Carl, 1912), *Salpidobolus moenensis* (Carl, 1912) and *Eucardia velox* (Carl, 1912). *Polydesmus carli* nom. nov. is introduced as a replacement name for *Polydesmus japonicus* Carl, 1902, a junior homonym of *Polydesmus japonicus* Peters, 1864. *Odontopyge johanncarli* nom. nov. is introduced as a replacement name for *Odontopyge fasciata* Carl, 1905, a junior homonym of *Odontopyge fasciata* Attems, 1896.

Keywords: Jean Carl - Geneva - Basel - India - Indonesia - East Africa - Colombia - type catalogue.

INTRODUCTION

Johann (or Jean) Carl (1877-1944) joined the staff of the Muséum d'histoire naturelle de Genève (MHNG) as the junior assistant of Emil Frey-Gessner in 1900. Carl went on to become curator and eventually deputy director of the Museum. His scientific work followed on from that of Henri de Saussure, who published extensively on Hymenoptera, Orthoptera, Diplopoda and Crustacea (Hollier & Hollier, 2013). Saussure's influence was such that Carl worked on all of these groups, and was also a pioneer in the study of the Collembola (Revilliod, 1945). His Orthoptera type specimens are all in the MHNG (Hollier, 2010). The Diplopoda he studied included material collected on his own expeditions to East Africa and southern India, but he also examined the collections made on the expeditions of several other Swiss and German naturalists, and many type specimens were

therefore deposited in other museums. In the first such study (Carl, 1905) he was invited by Ignacio Bolívar to study specimens collected by Martínez de la Escalera in Guinée Espagnole (now Equatorial Guinea) in the Museo Nacional de Ciencias Naturales (MNCN) in Madrid (Bolívar being a long-term collaborator of Saussure). Carl (1912c) studied the Diplopoda collected by Paul and Fritz Sarasin, both biologists from Basel, who left most of their collections to the Naturhistorisches Museum Basel (NMB), on their expedition to Celebes (now Sulawesi in Indonesia). He also (Carl, 1912c, 1913a) studied specimens from Celebes and Sumatra collected by Johannes Elbert and deposited in the Naturhistorisches Museum Bern (NMBE) and in the Senckenberg Naturmuseum Frankfurt (SMF). Fritz Sarasin, this time with Jean Roux of the NMB, also collected in New Caledonia and the Loyalty Islands, and

Carl (1926) worked on their specimens. Carl (1914b) studied the Diplopoda collected by the expedition of Fuhrmann and Mayor to Colombia. Their trip was partly funded by the city of Neuchâtel and their specimens ought to be deposited in the Musée d'histoire naturelle de Neuchâtel but they are apparently not there. Carl (1922) treated Diplopoda specimens collected in Indonesia by Hugo von Buttel-Reepen, who was the director of the Oldenburger Naturhistorisches Museum. The collection of W. Morton (who collected in Malaysia/Indonesia) is in the Musée cantonal de zoologie in Lausanne, and Carl (1909a) treated a number of Diplopoda specimens collected by him. He also (Carl, 1912a) described the Diplopoda specimens collected by Hugo Merton in the Aru and Kai Islands (now in Indonesia).

Carl published more than 30 articles on the Diplopoda (27 with descriptions of new taxa) and described 390 species or subspecies between 1902 and 1942. Carl did not designate holotypes, and did not always state how many specimens he had available for his descriptions (if there were few specimens he generally enumerated them, but was content with “several” or “many” if there were more). He clearly understood the need for fixing a type specimen however, and his labels often indicate types and cotypes although this has no formal meaning because it was not usually mentioned in the original description. Carl made a distinction between subspecies and varieties in his descriptions but, because they were all published before 1960, they must all be treated as being of subspecific rank. Carl generally provided adequate illustrations to accompany his descriptions, and also helpfully revised many of Humbert and Saussure's types, illustrating features not mentioned in the early descriptions (Hollieri *et al.*, 2017). Specimens collected by other workers are often without a separate data label but usually have two identification labels with at least some information about provenance, one written by Carl (usually in pencil) and the other written in ink by another hand (see Fig. 1). Specimens collected by Carl himself often have a data label; these are handwritten in the case of the East Africa expedition and labels with “Voy. Carl et Escher, Inde méridionale” printed at the top and handwritten details added below in the case of the India expeditions.

ARRANGEMENT AND FORMAT

The species are arranged alphabetically. The format for each is:

specific epithet Author, year of publication, pages containing description, figures [*Original generic placement*].

Type locality and depository (if given) as stated in the original description. Type series as given in the original description.



Fig. 1. An example of the two identification labels that are typically found with Carl's specimens.

Number of specimens in the MHNG. Condition of specimens. Locality and other information written on the labels associated with the specimens (N.B. the printed data on Carl's India expedition labels is not repeatedly cited). Type status of the specimens. Information about type specimens in other collections. Other comments. Currently valid combination, current family placement. Nomenclature follows Sierwald & Spelda (2019).

The following abbreviations are used in the catalogue:

- BMNH Natural History Museum, London
- HNHM Hungarian Natural History Museum, Budapest
- MCZL Musée cantonal de zoologie, Lausanne
- MHNG Muséum d'histoire naturelle de Genève
- MNCN Museo Nacional de Ciencias Naturales, Madrid
- MTD Museum für Tierkunde, Dresden (collection destroyed in World War II)
- NHMW Naturhistorisches Museum, Wien
- NMB Naturhistorisches Museum, Basel
- NMBE Naturhistorisches Museum, Bern
- SMF Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt
- UZH Zoological Museum, University of Zurich
- ZMHB Museum für Naturkunde, Berlin
- ZMUH Zoologisches Museum Centrum für Naturkunde der Universität Hamburg

CATALOGUE

acceptus Carl, 1914b: 907-908, fig. 143 [*Batodesmus*]. Gauduas. One ♂.

The MHNG collection contains two gonopods in alcohol (MHNG-ARTO-14350). The vial containing them has the label “*Batodesmus acceptus* Carl, ♂ type, gonopode” indicating that they belong to the holotype, while a photocopy of an original label in the jar gives the

locality as “Colombie”. The whereabouts of the rest of the specimen is unknown.

Batodesmus acceptus Carl, 1914, Chelodesmidae

acceptus Carl, 1941b: 649-652, figs 115-120 [*Ktenostreptus*].

Untere Palnis: Tandikudi, 1500 m, in Cardamum-Pflanzung, unter Holz, 23.IV; Maryland, 1600 m. Moyar-Becken: Masinigudi, Busch. Three ♂, four ♀ and unspecified number of juveniles.

The MHNG collection contains 15 specimens in alcohol, in five tubes. The jar contains a label reading “Tandikudi 23.IV. Cardamum Estate, Unter Holz”. Each of the three ♂ is in a separate tube: the first (MHNG-ARTO-14236) is broken in half and has a data label with “Maryland” written on it; the second (MHNG-ARTO-14237) is accompanied by two smaller vials containing the head and anterior rings and the gonopods and has a data label with “Tandikudi” written on it; the third (MHNG-ARTO-14238) is broken into five parts, with a note that the gonopods have been slide mounted. The fourth tube (MHNG-ARTO-14239) contains two specimens, one broken, with a data label with “Masingudi, Busch” written on it. The fifth tube (MHNG-ARTO-14240) contains ten specimens, mostly broken, with a data label with “Tandikudi” written on it. The microscope slide preparation of the gonopods of a ♂ syntype (MHNG-ARTO-14238) is in a case glued to the lid of the jar. All of these specimens are syntypes.

Ktenostreptus acceptus Carl, 1941, Harpagophoridae

acutangulus Carl, 1926: 399-401, figs 47-52 [*Canacophilus (Anthogonopus)*].

Neu-Caledonien: Mt. Humboldt ca. 1100 m, 17. September 1911; Gipfel 1600 m, 18. September 1911. Unspecified number of ♂, ♀ and juveniles.

The MHNG collection contains three specimens, one with a pin running the length of the body, in alcohol (MHNG-ARTO-14292). The identification label in the jar has “Nlle Cal. Sarasin et Roux” written on it, indicating that the specimens are syntypes. There are two syntypes in the NMB (inventory numbers NMB-DIPL-00352a and NMB-DIPL-00352b). *Canacophilus acutangulus* is the type species of *Anthogonopus* Carl, 1926 by monotypy (Jeekel, 1971).

Canacophilus acutangulus Carl, 1926, Dalodesmidae

aequatorialis Carl, 1909b: 356-359, pl. 7, figs 25-30 [*Microspirobolus*].

Njarugenje (Central-Ruanda), im Tal des Njaranda, Jinja (Busoga), bei den Riponfällen des Nils. Unspecified number of ♂ and ♀.

The MHNG collection contains some 70 specimens in alcohol in two jars. The first jar (MHNG-ARTO-14417) contains 28 specimens, several of them broken. One specimen is separated in a small vial with the anterior of the body and the gonopods detached: this specimen

is here designated lectotype. Two specimens with pins running the length of the body are in a second small tube. The identification labels have “Njarugenje, Central-Ruanda Dr J. Carl” and “Rwanda centr. J. Carl Types” written on them respectively and there is a printed “Type” label, indicating that the specimens are part of the type series. The second jar (MHNG-ARTO-1 4418) contains some 40 specimens, many of them broken into several parts. The original pencil-written identification label has “Njarugenje J. Carl” written on it. Although there is no type label, there is no reason to doubt that these are part of the type series. There are three syntypes in the ZMUH (Weidner, 1960), six in the MCZL and three in the NMB (inventory number NMB-DIPL-00185a). *Microspirobolus aequatorialis* was designated as the type species of the genus *Microspirobolus* Carl, 1909 by Brölemann (1914) but the name is preoccupied by *Microspirobolus* Silvestri, 1898. Carl (Carl in Brölemann, 1914) proposed the replacement name *Brachyspirobolus* Carl, 1914, with *B. aequatorialis* as the type species by direct substitution (Jeekel, 1971).

Brachyspirobolus aequatorialis (Carl, 1909), Pachybolidae

alatus Carl, 1914b: 900-901, fig. 130 [*Alocodesmus*].

Unterhalb Bodega central. Unspecified number of ♂ and ♀.

The MHNG collection contains one ♂ specimen in alcohol (MHNG-ARTO-14351) which is here designated as lectotype. The specimen is in a glass vial with some loose legs while the gonopods are in a separate smaller vial. The identification labels have “Bodega Central (Colombie)” and “Colombie, coll. Fuhrmann.” written on them respectively, and a printed “Cotype” label, indicating that the specimen is a syntype. There is an undated typewritten label stating that Hoffman had identified the specimen as *Carlopeltis alatus*. The whereabouts of the other syntype(s) is unknown. *Carlopeltis alatus* is the type species of the genus *Carlopeltis* Verhoeff, 1938 by monotypy (Jeekel, 1971).

Carlopeltis alatus (Carl, 1914), Chelodesmidae

alatus Carl, 1912c: 146-148, pl. 5, fig. 16 [*Platyrrhacus*]. Roembi-Mengkoka, S.-O.-Celebes (Dr J. Elbert); S.-O.-Celebes (coll. Sarasin). One damaged ♂ and two ♀.

No specimens found in the MHNG. The SMF collection contains fragments of four ♂ and at least two ♀ in alcohol. The identification label has “Roembi-Mengkoke, SO-Celebes, J. Elbert” written on it. After examination of these type specimens, one ♂ (SMF 829) was placed in a separate jar and is here designated as lectotype. There is one ♀ paralectotype (referred to as “Typ” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00137a).

Mastigorhacus alatus (Carl, 1912), Platyrrhacidae

albicans Carl, 1902: 570-572, pl. 10, figs 3-4 [*Strongylosoma*].

Sumatra, Dr. Moesch (Zürcher Museum). One ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14293). The specimen is in a vial. A second vial contains a single gonopod; it is not clear if this is from the specimen in the jar or from the other syntype. The identification labels in the jar have "type Sumatra (Moesch)" written on them and indicate that the specimen is a syntype. The other syntype is presumably in the UZH.

Sundanina albicans (Carl, 1902), Paradoxosomatidae

albidus Carl, 1932: 485-487, figs 103-108 [*Sholaphilus*]. Palnis: Shola bei Vandaravu, 2300 m unter morschem Holz, 6.-10.IV. Unspecified number of ♂ and ♀.

The MHNG collection contains parts of some 20 specimens, some broken, in alcohol (MHNG-ARTO-14294). The specimens are in a vial separated by a cotton wool plug from a smaller vial containing fragments including antennae and gonopods. The data label has "Palnis, Vandaravu" written on it, indicating that the specimens are syntypes. *Sholaphilus albidus* is the type species of the genus *Sholaphilus* Car, 1932 by monotypy (and not by designation in the original description as stated by Jeekel, 1971).

Sholaphilus albidus Carl, 1932, Fuhrmannodesmidae

alticola Carl, 1912c: 103-104 [*Nesoglomeris*].

Gipfel des Bowonglangi; Süd-Celebes (coll. Sarasin). One ♀.

No specimens found in the MHNG. The ♀ holotype (referred to as "Typ" in the NMB catalogue) is in the NMB (inventory number NMB-DIPL-00111a).

Hyleoglomeris alticola (Carl, 1912), Glomeridae

ambigua Carl, 1941a: 359-361, figs 1-3 [*Orthomorpha* (*Kalorthomorpha*)].

Soekaboemi, West-Java. E. Walch leg. Museum Genf. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14295). The specimen is broken and placed in a small vial, while several fragments including a gonopod are in a separate small vial. The identification labels have "type Java, E. Walch" written on them, indicating that the specimen is the holotype.

Tectoporus ambiguus (Carl, 1941), Paradoxosomatidae

ambiguus Carl, 1914b: 941, fig. 204 [*Aphelidesmus*].

Cafetal Buenavista bei Viota. Coll. Fuhrmann. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Aphelidesmus ambiguus Carl, 1914, Aphelidesmidae

ambiguus Carl, 1926: 424-246, figs 83-86 [*Spirobolellus*]. Neu-Caledonien: Tchalabel, unter Kalkblöcken, 5. Mai

1911; Oubatche, Wald, unter faulem Holz, April 1911; Mt. Ignambi, Wald, April 1911, 800-1000 m; Hienghène; Insel Ouedjo bei Hienghène, Juni 1911; Canala, März 1912; Bourail, 26. Jan. 1912; La Foa, 16. Jan. 1912. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in two jars. The first jar (MHNG-ARTO-14328) contains four specimens, one with a pin running the length of the body, and a vial containing gonopods. The identification label has "Drs F. Sarasin & J. Roux, N. Caled. Bourail 2.II.12" written on it, and the specimens are presumably syntypes despite the collecting date not corresponding to that in the original description. The second jar (MHNG-ARTO-14329) contains a specimen collected in 1977 which is clearly not part of the type series. There are 12 syntypes (referred to as "Typen" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00363a to NMB-DIPL-00363g).

Spirobolellus ambiguus Carl, 1926, Spirobolellidae

americanus Carl, 1902: 611-613, pl. 11, fig. 37 [*Polydesmus*].

Texas, J. Boll (Genfer Museum). Two ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14296) under the name *Pseudopolydesmus americanus*. Both specimens have a pin running the length of the body. The data label in the jar reads "Texas, J. Boll" and one of the identification labels has "Type" written on it, indicating that the specimens are syntypes. A handwritten note states that Hoffman examined the specimens in 1960 and intended to designate the smaller specimen as the lectotype; this designation does not appear to have been published and Hoffman (1999: 445) erroneously refers to a holotype deposited in the MHNG. Two microscope slide preparations of gonopods of syntypes (MHNG-ARTO-14297) are in a case glued to the lid of the jar.

A junior synonym of *Pseudopolydesmus pinetorum* (Bollman, 1888), Polydesmidae

ammonites Carl, 1914b: 965 [*Trigonostylus*].

Camelia, Kaffeepflanzung, 1800 m. One ♀.

No specimens found in the MHNG. The whereabouts of the holotype is unknown.

Cyrtodesmus ammonites (Carl, 1914), Cyrtodesmidae

andinus Carl, 1914b: 960-961, figs 248-257 [*Calymmodesmus*].

Puerto de los Pobres, am Cauca-Fluss. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol. The specimens, one of which is in three pieces, are in a small vial (MHNG-ARTO-14353). A second vial (MHNG-ARTO-14354) contains gonopods and dissected parts of a head. The identification labels have "Cauca (Colombie)" and "Colombie, Coll. Fuhrmann ♂" written on them respectively and there is a printed "Cotype"

label indicating that the specimens are syntypes. *Calymmodesmus andinus* is the type species of the genus *Calymmodesmus* Carl, 1914 by monotypy (Jeekel, 1971). *Calymmodesmus andinus* Carl, 1914, Pyrgodesmidae

andropygus impunctatus Carl, 1918: 458-459, figs 40-45 [*Trigoniulus*].

Ile Deslacs, L. Biro leg. Musée national hongrois. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol. The two specimens, each with a pin running the length of the body, are in a glass vial (MHNG-ARTO-14355). A smaller vial (MHNG-ARTO-14356) contains gonopods, antennae and some legs. The identification labels both have "Ile Deslacs, Biró leg." written on them, indicating that the specimens are syntypes. There were presumably other syntypes in the HNHM, although these are not listed in Korsós (1983).

Trigoniulus andropygus impunctatus Carl, 1918, Pachybolidae

angustifrons Carl, 1905: 278-280, fig. 9 [*Spirostreptus*]. No explicit locality. Unspecified number of ♀.

No specimens found in the MHNG. According to Andrés Cobeta (2001: 70) there is a type specimen in the MNCN (MNCN 20.07/1174). *Spirostreptus angustifrons* Carl, 1905 is a junior homonym of *S. angustifrons* Brölemann, 1902. Given the large number of available names in the genus *Spirostreptus*, assignment of a replacement name is deferred until a taxonomic revision is carried out.

"*Spirostreptus angustifrons*" Carl, 1905, Spirostreptidae

annulipes Carl, 1917: 402-405, figs 23-24 [*Doratogonus*]. Patrie? One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14242). The jar contains three identification labels giving different locality information; the oldest has "Spirostreptus maritimus Koch, Brisbane, H. de Sss." written on it in Zehntner's handwriting. Carl's pencil label has "Patrie?" written on it while the ink label has "Afrique(?)" written on it. This is clearly the holotype. The specimen is accompanied by a small vial containing the gonopods.

Doratogonus annulipes Carl, 1917, Spirostreptidae

annulipes Carl, 1912c: 189-192, figs 25-27 [*Rhinocricus*]. Buol, N.-Celebes (coll. Sarasin). One ♂, one ♀ and an unspecified number of juveniles.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14316). The identification labels in the jar have "type Buol, N. de Celebes ex coll. Sarasin" written on them, indicating that the specimen is a syntype. There are three syntypes (one ♂, here designated as lectotype, one ♀ and one juvenile referred to as "Typen" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00162a).

Salpidobolus annulipes (Carl, 1912), Rhinocricidae

annulipes Carl, 1914b: 918-920, figs 163-165 [*Trichomorpha*].

La Camelia bei Angelopolis. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol. The specimens each have a pin running the length of the body and are in a glass vial (MHNG-ARTO-14357). A smaller vial (MHNG-ARTO-14358) contains gonopods. The identification labels in the jar both have "Colombie coll. Fuhrmann" written on them and there is a printed "Cotype" label, indicating that the specimens are syntypes. There are also two syntypes (one ♂ and one ♀ referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00227a).

Trichomorpha annulipes Carl, 1914, Chelodesmidae

areatus Carl, 1932: 490-493, figs 114-118 [*Archandrodesmus*].

Upper-Palnis: Kodaikanal, 24.X.1894, J.R. Henderson leg. (Brit. Museum); Bombay-Shola bei Kodaikanal, 2200 m, unter Holz; Maryian-Shola, 2300 m, 11.-14. IV; Kleine Sholas und Mimosawäldchen bei Pumbarai, 1900 m, 29.III; Kukkal-Shola unter Holz, 1.IV; kleine Kaffee-Plantage unterhalb Kukkal und Pumbarai, 1900 m; Sholas bei Vandaravu F.R., 2300 m, unter Holz, 6.IV. Travancore: Grosser Wald im oberen Vattavadai-Tal, zwischen Palnis und Anaimalais, 1850 m, 10.IV. Lower Palnis: Tandikudi, 1500 m, auf Mauer, nach Regen. Unspecified number of ♂ and ♀.

The MHNG collection contains 148 specimens in alcohol in eight vials. The first vial (MHNG-ARTO-14364) contains 14 specimens, two of them broken and a data label with "Travancore Vattavadai" written on it. The second vial (MHNG-ARTO-14365) contains 43 specimens, several of them broken, and a data label with "Palnis sup. Vandaravu" written on it. The third vial (MHNG-ARTO-14366) contains nine specimens and a data label with "Palnis sup. Kukkal-Shola" written on it. The fourth vial (MHNG-ARTO-14367) contains 13 specimens and two data labels with "Palnis sup. Pumbarai" and "Mimosawäldchen ob. Pumbarai, 29.III, Unter Holz" written on them respectively. The fifth vial (MHNG-ARTO-14368) contains 17 specimens, some broken, and a data label with "Palnis sup. Maryian-Shola" written on it. The sixth vial (MHNG-ARTO-14369) contains 14 specimens and a data label with "Palnis sup. Kukkal, plantation" written on it. The seventh vial (MHNG-ARTO-14370) contains 30 specimens, some broken, and a data label with "Palnis infér. Tandikudi" written on it. The eighth vial (MHNG-ARTO-14371) contains nine broken specimens, one of them separated in a smaller vial, and a data label with "Palnis sup. Kodaikanal Shola" written on it. These specimens are all syntypes. There is also type material in the BMNH. *Archandrodesmus areatus* was designated the type species of the genus *Archandrodesmus* Carl, 1932 in the original description. *Cryptocorypha areata* (Carl, 1932), Pyrgodesmidae

arietis Carl, 1912c: 151-152, pl. 5, figs 10-11 [*Platyrrhacus*].

Matinang-Kette (Nordseite) Nord Celebes 500-1000 m (coll. Sarasin). Unspecified number of ♂.

No specimens found in the MHNG. There is a single ♂ syntype (referred to as "Typ" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00138a). As the only known ♂ type, this specimen is here designated lectotype.

Erythracus arietis (Carl, 1912), Platyrrhacidae

armata Carl, 1902: 579-581, pl. 10, figs 19-20 [*Orthomorpha*].

Java, auf Kaffeeblättern, Dr. L. Zehntner (Genfer Museum). One ♂.

The MHNG collection contains one specimen; the main body of the specimen is in alcohol (MHNG-ARTO-14360) and two legs and part of a gonopod are mounted on a microscope slide (MHNG-ARTO-14361). The identification labels have "type Java, Zehntner" and "Java, Zehntner" written on them respectively, indicating that the specimen is the holotype. An undated typewritten label states that Hoffman considered the specimen to belong to an unknown genus, and an undated label written in pencil reads "Orthomorpha armata Carl, ♂ holotype (7th somite missing) balsam preparation of telopodite of left gonopod + 2 legs separate, Jeekel". Jeekel (1980b) gave a new illustration of the gonopod and placed the species in the genus *Nesorthomorpha* Jeekel, 1980.

Nesorthomorpha armata (Carl, 1902), Paradoxosomatidae

asperrimus Carl, 1932: 441-443, figs 27-30 [*Grammorhabdus*].

Palnis: Maryland, Neutral Saddle; exponierter Westhang, ca. 1600 m, 19.IV. – Tandikudi, ca. 1500 m, Cardamum-Plantage, 23.IV. More than one ♂ and ♀.

The MHNG collection contains five specimens in alcohol in two vials. The first vial (MHNG-ARTO-14362) contains one specimen with a pin running the length of the body and a data label with "Palnis inf., Tandikudi" written on it. The second vial (MHNG-ARTO-14363) contains four specimens, two with a pin running the length of the body and the other two broken into several pieces. One of the specimens with a pin running the length of the body is separated in a smaller vial, and there is another vial with gonopods. The data label has "Maryland, Palnis inf." written on it. There is also a pencil written label reading "♂ lectotype and 3 ♀ lectoparatypes". Jeekel (1980a: 176) designated the ♂ from Neutral Saddle as the lectotype, the other specimens are paralectotypes. *Grammorhabdus asperrimus* is the type species of the genus *Grammorhabdus* Carl, 1932 by monotypy (Jeekel, 1971). An undated typewritten label in the jar states that Hoffman identified the specimens as *Polydrepanum asperrimum* (Carl).

Polydrepanum asperrimum (Carl, 1932), Paradoxosomatidae

asperus Carl, 1905: 269-271, figs 4-4b [*Cordyloporus* (*Neocordyloporus*)].

Cabo St Juan. Unspecified number of ♂ (♀ not mentioned explicitly).

No specimens found in the MHNG. Andrés Cobeta (2001) did not locate any type specimens in the MNCN. *Neocordyloporus asperus* is the type species of the genus *Neocordyloporus* Carl, 1905 by monotypy (Jeekel, 1971).

Neocordyloporus asperus Carl, 1905, Chelodesmidae

attemsi Carl, 1914b: 895 [*Chondrodesmus*].

Replacement name for *Leptodesmus goudoti* Gervais, 1847 *sensu* Attems (1898: 375), which Carl recognised as a species distinct from Gervais' original species concept. No specimens found in the MHNG. There is a syntype in the ZMUH (Weidner, 1960) and two in the ZMHB (Moritz & Fischer, 1978a).

Chondrodesmus attemsi Carl, 1914, Chelodesmidae

aubryi luteola Carl, 1902: 595 [*Cordyloporus*].

Goldküste, Dr. E. Mähli (Basler Museum). One ♀.

No specimens found in the MHNG. The ♀ holotype (referred to as "Syntypus variationis" in the NMB catalogue) is in the NMB (inventory number NMB-DIPL-00462-Ia) under the name *C. ornatus* var. *luteola*. A junior synonym of *Prepodesmus ornatus* (Peters, 1864), Chelodesmidae

augustus Carl, 1914b: 884-886, figs 110-112 [*Leptodesmus*].

La Camelia, Kaffeeepflanzung bei 1800 m. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14359). Two of the specimens have a pin running the length of the body, and they are accompanied by a pair of gonopods in a small vial. The identification labels have "Colombie (Camelia Kaffeeepflanzung) 2♂ 1♀" and "Colombie, Coll. Fuhrmann" written on them respectively, and there is a printed "Cotype" label, indicating that the specimens are syntypes. The jar also contains an undated typed label stating that Hoffman considered the specimens to belong to an undescribed genus. There are two syntypes (one ♂ and one ♀ referred to "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00222a).

Leptodesmus augustus Carl, 1914, Chelodesmidae

baccatus Carl, 1926: 387-389, figs 20-28 [*Atopogonus*].

Neu-Caledonien: Mt. Humboldt Gipfel 1600 m, 18. Sept. 1911; Mt. Canala, 4. Nov. 1911; Ignambi-Wald, 700-800 m, April 1911. One damaged ♂, one ♀ and an unspecified number of juveniles.

No specimens found in the MHNG. There are at least four syntypes (one ♂, one ♀ and juveniles referred to as "Typen" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00345a, NMB-DIPL-00345b and

NMB-DIPL-00345c). *Atopogonus baccatus* is the type species of the genus *Atopogonus* Carl, 1926 by monotypy (Jeekel, 1971).

Agathodesmus baccatus (Carl, 1926), Haplodesmidae

bacillifer Carl, 1912c: 153-154 [*Opisthoporodesmus*]. Masarang, in Baummoos (coll. Sarasin). Two ♀, possibly juveniles.

No specimens found in the MHNG. There is a single ♀ syntype (referred to as “Typ” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00139a).

Opisthoporodesmus bacillifer Carl, 1912, Opisetretidae

badaga Carl, 1932: 458-459, figs 52-54 [*Telodrepanum*]. Nilgiris: Kotagiri, 1900 m, J. R. Henderson (Brit. Museum). One damaged ♂.

No specimens found in the MHNG. The holotype could not be located in the BMNH and is presumably lost. *Telodrepanum badaga* is the type species of the genus *Telodrepanum* Carl, 1932 by monotypy (Jeekel, 1971).

Telodrepanum badaga Carl, 1932, Paradoxosomatidae

bernardinensis Carl, 1918: 436-439, figs 14-15 [*Rhinocricus*].

San Bernardino, Paraguay. Dr Hassler leg. Muséum de Genève. One ♂ and two ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14376). Two of the specimens have a pin running the length of the body, the other is broken but both parts have pins running along them. There is also a small vial containing the gonopods. One of the identification labels has “San Bernardino (Paraguay), Dr Hassler leg.” written on it, indicating that the specimens are syntypes. The ♂ specimen is here designated lectotype.

Argentocricus bernardinensis (Carl, 1918), Rhinocricidae

bicolor Carl, 1909b: 319-321, pl. 6, fig 20 [*Lophostreptus*].

Kirehe in Kissaka (Südost-Ruanda), in Bananenpflanzungen. Njarungenje bis Niansa (Central-Ruanda). Unspecified number of ♂ and ♀.

The MHNG collection contains some 53 specimens in alcohol in three jars. One jar (MHNG-ARTO-14377) contains the lectotype designated by Demange & Mauriès (1975: 69). The specimen is in two parts, and the gonopods are separate in the same vial. The identification labels are original, and have the locality “Njarungenje, Dr Carl” and “types!” written on them respectively. A handwritten label in the jar reads “*Lophostreptus bicolor* Carl. Njarungenje (Central Ruanda) LECTOTYPE – J.M. Demange 24.X.68. Exempleire issu du bocal unique de Carl”. The second jar (MHNG-ARTO-14378) contains some 40 specimens, many of them broken and two with pins running the length of the body. There are typewritten copies of the original labels, and these specimens are paralectotypes. The third jar (MHNG-ARTO-14379)

contains 12 specimens, some broken. The identification label has “Njarungenje-Niansa, Dr J Carl” written on it. Although not explicitly labelled as types, these specimens are also paralectotypes. There is a paralectotype in the NMB (inventory number NMB-DIPL-00178a) and three in the MCZL. *Lophostreptus bicolor* is the type species of *Carlostreptus* Verhoeff, 1941c by monotypy (Jeekel, 1971).

Lophostreptus bicolor Carl, 1909, Spirostreptidae

bicolor Carl, 1902: 594-595 [*Prionopeltis*].

Neuseeland, Nordinsel. H. Suter (Berner Museum). Two ♀.

No specimens found in the MHNG collection. The syntypes are presumably in the NMBE.

Desmoxytes bicolor (Carl, 1902), Paradoxosomatidae

bimontana Carl, 1932: 431-433, figs 14-15 [*Orthomorpha* (*Gyrodrepanum*)].

Anaimalais: Valparai, ca. 1100 m, 7.III.27, Talboden, unter morschen Stämmen. Nilgiris: Kartery-Valley, unterhalb Coonoor, 1600 m, Bananenpflanzung unter Steinen und Strünken. Unspecified number of ♂ and ♀.

The MHNG collection contains 36 specimens in alcohol in two jars. The first jar (MHNG-ARTO-14373) contains eight specimens, three of them broken and one with a pin running the length of the body. The data label has “Nilgiris, Karerai-Valley, bananarie” written on it. The second jar (MHNG-ARTO-14374) contains 28 specimens, many of them broken and two smaller vials, one with two of the specimens, one of which has a pin running the length of the body, and the other with gonopods. The data label has “Anaimalais, Valparai” written on it. The identification label has “♂, ♀ types! – cotypes” written on it. All of these specimens are syntypes. *Orthomorpha bimontana* is the type species of *Gyrodrepanum* Carl, 1932 by monotypy (Jeekel, 1971).

A junior synonym of *Gyrodrepanum lamprum* (Chamberlin, 1920), Paradoxosomatidae

biolleyi Carl, 1902: 658-661, pl. 11, figs 67-68 [*Platyrrhacus*].

Las Delicias (Costarica), P. Biolley (Genfer Museum). One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14375). The identification labels have “Les Delicias (Costa Rica) P. Biolley” and “type Les Delicias (Costa Rica) P. Biolley” written on them respectively, indicating that the specimen is the holotype. An undated typewritten label in the jar shows that Hoffman identified the specimen as *Tiroidesmus biolleyi* (Carl).

Tiroidesmus biolleyi (Carl, 1902), Platyrrhacidae

biporus Carl, 1932: 500-503, figs 131-139 [*Pagodesmus*].

Palnis: Vandaravu, 2350 m, Sholas, unter Holz, 10.IV; Mariyanshola, 2300 m; Kleine Shola ob[erhalb]

Pumbarai, 1900 m, 29.II., unter Holz. Travancore: Grosser Wald, im oberen Vattavadai-Tal, zwischen Palnis und Anaimalais, 1850 m, 10.IV. Unspecified number of ♂, ♀ and juveniles.

The MHNG collection contains some 40 specimens in alcohol in three vials. The first vial (MHNG-ARTO-14243) contains five specimens in a smaller vial and a data label with "Palnis, Mariyanshola" written on it. The second vial (MHNG-ARTO-14244) contains two specimens separated by a cotton wool plug, one with a data label with "Palnis, Pumbarai" written on it and the other with a data label with "Travancore, Vattavadai" written on it. The third vial (MHNG-ARTO-14245) contains some 30 specimens separated from a smaller vial by a cotton wool plug; the vial contains a pair of gonopods and other fragments. The data label has "Palnis, Vandaravu" written on it. These specimens are all syntypes. *Pagodesmus biporus* was designated the type species of the genus *Pagodesmus* Carl, 1932 in the original description.

Pagodesmus biporus Carl, 1932, Pyrgodesmidae

bipulvillata Carl, 1902: 586-589, pl. 10, figs 17-18 [*Orthomorpha*].

Java, Dr. L. Zehntner (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol in three vials. The first vial (MHNG-ARTO-14380) contains the lectotype designated by Jeekel (1980b: 327). The specimen has a pin running the length of the body, and is accompanied by a smaller vial containing the left gonopod. The second vial (MHNG-ARTO-14381) contains three ♂ paralectotypes. The specimens each have a pin running the length of the body, and there are two smaller vials containing gonopods and other dissected parts. The third vial (MHNG-ARTO-14382) contains a ♀ paralectotype. The identification labels in the jar have the locality "Java Zehntner" and "Types!" written on them respectively. There is also a handwritten label reading "Orthomorpha bipulvillata Carl, lectotype ♂, 3 ♂ and 1 ♀ paralectotypes Jeekel, 1976".

Orthomorpha bipulvillata was designated the type species of the genus *Diglossosternum* Jeekel, 1980b in the original description of the genus.

Diglossosternum bipulvillatum (Carl, 1902), Paradoxosomatidae

biseriatus Carl, 1926: 384-386, figs 15-19 [*Plethodesmus*]. Tchalabel, 5. Mai 1911. Unspecified number of ♂, ♀ and juveniles.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14322). The identification labels have "Tchalabel N. Caled. Sarasin et Roux" written on them, indicating that the specimen is a syntype. There are several syntypes (♂, ♀ and juveniles referred to as "Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00344a). *Plethodesmus biseriatus*

is the type species of the genus *Plethodesmus* Carl, 1926 by monotypy (Jeekel, 1971).

Plethodesmus biseriatus Carl, 1926, Pyrgodesmidae

bitaeniatus Carl, 1912b: 167-168, figs 1-2, & text fig. B [*Trigoniulus*].

Lombok. Sadjang. Dr. J. Elbert. Unspecified number of ♂ and ♀.

No specimens found in the MHNG. The SMF collection contains one jar with three ♂ and one ♀ accompanied by a microvial with dissected gonopods. The identification label in the jar has "Lombok: Sadjang, Elbert, 1909" written on it, indicating that the specimens are types. After examination of the type specimens, one ♂ (SMF 1385) was placed in a separate jar and is here designated as lectotype.

Trigoniulus bitaeniatus Carl, 1912, Pachybolidae

bivirgatus Carl, 1902: 652-655, pl. 11, fig. 65 [*Platyrrhacus*].

San José (Costarica), P. Biolley (Genfer Museum). One ♂ and five ♀.

The MHNG collection contains six specimens in alcohol in two jars. The first jar (MHNG-ARTO-14383) contains four specimens and a small vial containing a gonopod. The identification labels in the jar have "Costa Rica, St José, Port Limon P. Biolley" and "types! Costa Rica, St José, Port Limon P. Biolley" written on them respectively, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18549) contains two specimens. The identification labels in the jar have "Costarica St José" and "types! St José, Port Limon P. Biolley" written on them respectively, indicating that the specimens are also syntypes. Hoffman (1999: 396) states that he examined the ♂.

A junior synonym of *Nyssodesmus phyton* (Peters, 1864), Platyrrhacidae

boetonense Carl, 1912c: 119-120, text fig. 8 [*Castanotherium*].

Insel Boëton, südöstl. von Celebes (coll. Elbert). One ♀. No specimens found in the MHNG. The holotype was expected to be in the SMF but could not be found.

Castanotherium boetonense Carl, 1912, Zephroniidae

bogotensis Carl, 1914b: 849-851, figs 32, 49-54 [*Stemmatoiulus*].

Bogota, 2600 m; Paramo Cruz Verde, 3400 m (Ost-Cordillere). Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens and dissected parts in alcohol in six vials. The first vial (MHNG-ARTO-14404) contains two specimens. The second vial (MHNG-ARTO-14405) contains a head and part of the first body ring, and a handwritten label "Stemm. spec. 3 ♂". The third vial (MHNG-ARTO-14406) contains three pairs of legs and the label "♀". The fourth vial (MHNG-ARTO-14407) contains a head, part of the

first body ring and gonopods. The fifth vial (MHNG-ARTO-14408) contains gonopods, two legs and some unidentifiable fragments, and the label “♂”. The sixth vial (MHNG-ARTO-14409) contains gonopods. It is not clear which, if any, of the dissected parts belong to the specimens in the first vial. The identification label in the jar has the locality “Colombie, Coll. Fuhrmann” written on it, and there is a printed “Cotype” label, indicating that the specimens are syntypes. There is a further ♀ syntype in the NMB (inventory number NMB-DIPL-00210a).

Stemmiulus bogotensis (Carl, 1914), Stemmiulidae

braueri Carl, 1913c: 213-215, figs 1-4 [*Holopodostreptus*]. Santa Inez, Ecuador (Zoolog. Museum Berlin). Unspecified number of ♂ and ♀.

No specimens found in the MHNG collection. The ZMHB collection contains five syntypes (Moritz & Fischer, 1974). *H. braueri* is the type species of the genus *Holopodostreptus* Carl, 1913 by monotypy (Jeekel, 1971).

Holopodostreptus braueri Carl, 1913, Pseudoannolenidae

braueri Carl, 1918: 420-423, fig. 2 [*Polylepiscus*].

Santa Inez, Ecuador. R. Haensch leg. Musée de Berlin. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14403). One of the identification labels in the jar has “♂♀ cotypes, Santa Inez, Ecuador, R. Haensch leg.” written on it, indicating that the specimens are syntypes. There are four syntypes in the ZMHB (Moritz & Fischer, 1978a). *Polylepiscus braueri* was designated as the type species of *Sculptoteles* Vohland, 1998 in the original description of the genus.

Sculptoteles braueri (Carl, 1918), Aphelidesmidae

brevicornis Carl, 1914b: 950, figs 223-227 [*Cryptogonodesmus*].

Alto San Miquel. One ♂.

No specimens found in the MHNG. The whereabouts of the holotype is unknown. *Cryptogonodesmus brevicornis* is the type species of *Schizotelopus* Verhoeff, 1941b by monotypy (Jeekel, 1971).

Schizotelopus brevicornis (Carl, 1914), Fuhrmannodesmidae

brevipes Carl, 1914b: 876-877, figs 101-102 [*Rhinocricus*].

La Camelia, Kaffeepflanzung bei Angelopolis, 1800 m. One ♂ and one ♀.

No specimens found in the MHNG. The whereabouts of the syntypes is unknown. *Rhinocricus brevipes* Carl, 1914 is a junior homonym of *R. brevipes* Karsch, 1881 and a replacement name was proposed by Schubart (1951).

Rhinocricus colombianus Schubart, 1951, Rhinocricidae

bugnioni Carl, 1918: 449-452, figs 29-32 [*Cingalobolus*]. Ceylan. Dr Ed. Bugnion leg. Muséum de Genève. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14410). The specimen, which has a pin running the length of the body, is in one vial and the gonopods in another. One of the identification labels has “Ceylan, Dr E. Bugnion” written on it and there is a printed “Type” label, indicating that the specimen is the holotype. *Cingalobolus bugnioni* is the type species of the genus *Cingalobolus* Carl, 1918 by monotypy (Jeekel, 1971).

Cingalobolus bugnioni Carl, 1918, Pachybolidae

butteli Carl, 1922: 577-579, figs S-U [*Cambalopsis*].

Bandar Baroe; 3500'. Zentralsumatra. One ♂.

The MHNG collection contains two microscope slide preparations of parts of the holotype: 1) a slide (MHNG-ARTO-14413) with the dissected head and the second and third pairs of legs. 2) a slide (MHNG-ARTO-14414) with gonopods. The rest of the specimen is in the ZMHB collection (Moritz & Fischer, 1974).

Trachyjulus butteli (Carl, 1922), Cambalopsidae

butteli Carl, 1922: 576-577, fig. R [*Prionopeltis*].

Tjibodas, Zentraljava. 4500' Höhe. One ♂.

No specimens found in the MHNG collection. The holotype is in the ZMHB collection (Moritz & Fischer, 1978a).

Orthomorpha butteli (Carl, 1922), Paradoxosomatidae

butteli Carl, 1922: 573-574, figs L-M [*Opisotretus*].

Säntis (Distrikt Deli). Ostsumatra, in verlassenen Grabwespennest. One ♂.

The MHNG collection contains a microscope slide preparation of the holotype (MHNG-ARTO-14411). The specimen is broken into two parts, and the gonopods are separate and damaged.

Solaenaulus butteli (Carl, 1922), Opisotretidae

butteli birmanica Carl, 1941a: 374-376, figs 26-27 [*Solaenaulus*].

Irawadi, Birma. Unspecified number of ♂ and ♀.

The MHNG collection contains 19 specimens in alcohol (MHNG-ARTO-18583). The jar contains two vials: the first contains ten specimens, five of them broken and an identification label with “Irawadi, Birmanie” written on it; the second contains nine specimens, four of them broken, and an identification label with “Irrawadi [sic] Oates leg.” written on it. The identification labels in the jar have “Birmanie Oates leg.” and “Irawaddi [sic] (Birmanie) Oates leg.” written on them respectively, indicating that the specimens are syntypes.

Solaenaulus birmanicus Carl, 1941, Opisotretidae

caledonicus Carl, 1926: 403-405, figs 54-57 [*Agastrophus*].

Neu-Caledonien: Tchalabel, unter Kalkblöcken, 5. Mai 1911; Hienghène, Mai 1911. Two ♂ and an unspecified number of ♀.

No specimens found in the MHNG. There are at least four syntypes (two ♂ and several ♀ referred to as "Typen" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00355a and NMB-DIPL-00355b).

Hypocambala caledonica (Carl, 1926), Cambalopsidae

canalensis Carl, 1926: 423-424, figs 80-82 [*Spirobolellus*].

Neu-Caledonien: Canala; Halbinsel Bogota, bei Canala, ca. 500 m, September 1911. Four ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14327). The specimen has a pin running the length of the body. The identification label has "Mt Canala Nlle. Caledonie" written on it, indicating that the specimen is a syntype. The other three syntypes (referred to a "Typen" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00362a and NMB-DIPL-00362b).

Spirobolellus canalensis Carl, 1926, Spirobolellidae

canonicus Carl, 1932: 524-527, figs 178-184 [*Steganostigmus*].

Palnis: Akazienwäldchen oberhalb Pumbarai, ca. 1900 m, 29.III., unter Holz. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains one broken specimen in alcohol (MHNG-ARTO-14246). The data label has "Pumbarai" written on it and the identification label has "♂ type!" written on it, indicating that the specimen is the holotype. *Steganostigmus canonicus* was designated the type species of the genus *Steganostigmus* Carl, 1932 in the original description.

Steganostigmus canonicus Carl, 1932, Pyrgodesmidae

carbonarius Carl, 1914b: 894-895, fig. 122 [*Chondrodesmus*].

Argelia, Kaffeepflanzung bei Viota, 1600 m. One ♀.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Chondrodesmus carbonarius Carl, 1914, Chelodesmidae

cardamomi Carl, 1932: 478-479, figs 86, 91-93 [*Pseudosphaeroparia*].

Anaimalais: Cardamum-Pflanzung bei Valparai, an Bach, unter sehr feuchtem Laub, 1100 m, 4.III (Type); Naduar-Estate, Kaffee-Pflanzung, 7.III. Unspecified number of ♂ and ♀.

The MHNG collection contains three broken specimens in alcohol, in two jars. The first jar (MHNG-ARTO-14247) contains a vial containing a broken ♂ separated by a colon wool plug from a smaller vial containing gonopods and other fragments. The data label has "Anaimalais, Valparai 4.III" written on it and the identification label has "♂ type!" written on it, indicating that the specimen is the holotype. The other (MHNG-ARTO-14248) contains two broken ♀ and a data label with "Anaimalais, Naduar

Est. 7.III" written on it. The female specimens can be considered paratypes.

Pseudosphaeroparia cardamomi Carl, 1932, Fuhrmannodesmidae

carli Attems, 1914: 317 [*Rhinocricus*].

Replacement name for *Rhinocricus montivagus* Carl, 1912, a junior homonym of *R. montivagus* Silvestri, 1895.

Acladocricus carli (Attems, 1914), Rhinocricidae

caudatus Carl, 1941b: 645-648, figs 110-114 [*Leptostreptus*].

Ceylon: Pundaloya, Green leg. British Museum. One ♂. No specimens found in the MHNG collection. The holotype has not been located in the BMNH, and the specimen is probably lost.

A junior synonym of *Leptostreptus caudiculatus* (Karsch, 1881), Harpagophoridae

celebensis Carl, 1912c: 126-128, pl. 5, figs 1-3, pl. 6, figs 23-24 [*Rhinotus*].

Vulkan-Reihe, Nord-Celebes (coll. Sarasin). One ♂.

No specimens found in the MHNG collection. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00124a).

Rhinotus celebensis Carl, 1912, Siphonotidae

centralis Carl, 1912c: 176-178 [*Rhinocricus*].

Flachland nördl. vom Golf von Boni, Central-Celebes; Matanna-See, nördl. S.O.-Celebes; Ussu, S.O.-Celebes (coll. Sarasin). Two ♂ and three ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14312). The identification labels both have "type Celebes central, ex coll. Sarasin" written on them, indicating that the specimen is a type. The other four syntypes (referred to as "Typen" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00156a and NMB-DIPL-00156b).

Salpidobolus centralis (Carl, 1912), Rhinocricidae

centralis minor Carl, 1912c: 179, text fig. 18 [*Rhinocricus*].

Ussu, im N. von S.O.-Celebes (coll. Sarasin). Two ♂.

No specimens found in the MHNG collection. The two syntypes (referred to as ♀ "Typen" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00157a). This subspecies was synonymised with the nominal subspecies by Jeekel (2001: 34).

A junior synonym of *Salpidobolus centralis* (Carl, 1912), Rhinocricidae

centralis spectabilis Carl, 1912c: 178 [*Rhinocricus*].

Roembi-Mengkoka, S.O.-Celebes (Dr J. Elbert). One ♂. No specimens found in the MHNG collection. There is a jar containing one ♀ and a microvial with dissected gonopods in the SMF (SMF 1701). The whereabouts of

the rest of the ♂ holotype is unknown. This subspecies was synonymised with the nominal subspecies by Jeekel (2001: 34).

A junior synonym of *Salpidobolus centralis* (Carl, 1912), Rhinocricidae

cinctellus Carl, 1926: 405-406, figs 58-61 [*Agastrophus*]. Loyalty-Inseln: Lifou, 9. Mai 1912. Unspecified number of ♂ (♀ not explicitly mentioned).

No specimens found in the MHNG collection. There are two ♂ syntypes (referred to as “Typen” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00356a).

Hypocambala cinctella (Carl, 1926), Cambalopsidae

cinctus Carl, 1906: 235-236, figs 23-26 [*Sphaeropoeus* (*Castanotherium*)].

Sumatra (Coll. G. Schneider). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18447). This specimen is accompanied by a vial containing gonopods. The identification label in the jar has “Sumatra, Coll. G. Schneider” written on it, indicating that the specimen is a syntype. The whereabouts of the other syntypes is unknown.

Castanotherium cinctum (Carl, 1906), Zephroniidae

cinereus Carl, 1902: 597-598, pl. 10, figs 23-26 [*Pseudoprionopeltis*].

Neuseeland, H. Suter (Berner Museum). One ♂.

No specimens found in the MHNG. The holotype is presumably in the NMBE. *Pseudoprionopeltis cinereus* was designated as the type species of the genus *Pseudoprionopeltis* Carl, 1902 by Brölemann (1916).

Pseudoprionopeltis cinereus Carl, 1902, Dalodesmidae

coelebs Carl, 1902: 644-646, pl. 11, figs 69-70, 72 [*Platyrrhacus*].

Sumatra, Dr. Moesch (Zürcher Museum). One ♂.

No specimens found in the MHNG. The holotype is presumably in the UZH.

Trematorhacus coelebs (Carl, 1902), Platyrrhacidae

coelebs Carl, 1941b: 605-607, figs 57-58 [*Lankabolus*]. Ceylon: Pundaloya, ca. 1300 m ü. M. Green leg. (Brit. Museum of Nat. Hist.). Unspecified series (♀ not explicitly mentioned).

The MHNG collection contains a microscope slide preparation of gonopods (MHNG-ARTO-14436). Although not explicitly labelled as such, this is clearly part of the type series. The rest of the type series is in the BMNH. *Lankabolus coelebs* is the type species of the genus *Lankabolus* Carl, 1941 by monotypy (Jeekel, 1971).

A junior synonym of *Lankabolus greeni* (Pocock, 1892), Pachybolidae

columbiana Carl, 1914b: 827-828, figs 9-14 [*Siphonophora*].

La Camelia bei Angelopolis (Central-Cordilleren). Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14531). The identification labels in the jar have “Colombie Coll. Fuhrmann” and “Camelia Colombie Coll. Fuhrmann” written on them respectively and there is a printed “cotype” label indicating that the specimens are syntypes. There are two syntypes (one ♂ and one ♀ referred to as “Co-Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00208a).

Siphonophorella columbiana (Carl, 1914), Siphonophoridae

comicus Carl, 1926: 440-442, figs 119-121 [*Spirobolellus*].

Loyalty-Inseln: Ouvéa, Fayaoué, Mai 1912; Lifou, Képénéé, April 1912; Maré, Nétché und Raoua, Dez. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14337). Each specimen has a pin running the length of the body. The identification label has “Drs F. Sarasin & J. Roux, Fayaoué Ouvéa” written on it, indicating that the specimens are syntypes. There are several syntypes (♂ and ♀ referred to as “Typen” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00374a, NMB-DIPL-00374b and NMB-DIPL-00374c).

Spirobolellus comicus Carl, 1926, Spirobolellidae

comicus brevimaculatus Carl, 1926: 440 [*Spirobolellus*]. [Unspecified locality]. Unspecified series.

No specimens found in the MHNG or NMB under this name.

A junior synonym of *Spirobolellus comicus* Carl, 1926, Spirobolellidae

comicus lineata Carl, 1926: 441 [*Spirobolellus*].

[Unspecified locality]. Unspecified series.

No specimens found in the MHNG or NMB under this name.

A junior synonym of *Spirobolellus comicus* Carl, 1926, Spirobolellidae

comicus pleuralis Carl, 1926: 440 [*Spirobolellus*].

[Unspecified locality]. Unspecified series.

No specimens found in the MHNG or NMB under this name.

A junior synonym of *Spirobolellus comicus* Carl, 1926, Spirobolellidae

comicus rebellis Carl, 1926: 440 [*Spirobolellus*].

[Unspecified locality]. Unspecified series.

No specimens found in the MHNG or NMB under this name.

A junior synonym of *Spirobolellus comicus* Carl, 1926, Spirobolellidae

conjunctus Carl, 1918: 445-448, figs 22-28 [*Desmocraticus*].

Molukues. Muséum de Genève. One ♂ and one ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18452). The specimens are accompanied by a vial containing gonopods. The identification labels in the jars both have “Molukues” written on them, indicating that the specimens are the type series. The ♂ specimen is here designated lectotype. *Desmocraticus conjunctus* is the type species of the genus *Desmocraticus* Carl, 1918 by monotypy (Jeekel, 1971).

Desmocraticus conjunctus Carl, 1918, Rhinocricidae

constrictum Carl, 1912c: 135-136, pl. 5, fig. 8 [*Strongylosoma*].

Südliche Vorberge des Tokalekadjö ca. 1000 m, Central-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀. No specimens found in the MHNG collection. There are two syntypes in the NMB under the name *Orthomorpha constricta* (Carl, 1912) (inventory number NMB-DIPL-00129a).

Tectoporus constrictus (Carl, 1912), Paradoxosomatidae

contortipes Carl, 1932: 528-529, figs 187-189 [*Steganostigmus*].

Palnis: Vandaravu-Shola, ca. 2300 m, 6.IV, unter faulem Holz; Mariyanshola, ca. 2300 m, 10.-13.IV, unter faulem Holz. Three ♂.

The MHNG collection contains three specimens in two jars. The first jar (MHNG-ARTO-14249) contains two specimens, one broken, in a vial with a data label with “Vandaravu Shola 6.IV” written on it and a second tube containing gonopods. The second jar (MHNG-ARTO-14250) contains one specimen in a vial with a data label with “Mariyanshola, 10-16.IV” written on it. The labels show that these are the syntypes.

Steganostigmus contortipes Carl, 1932, Pyrgodesmidae

convexus Carl, 1914b: 890-891, fig. 118 [*Chondrodesmus*].

Morrón; Zwischen Fresno und Mariquita, 400 m ü. M. One ♂ and one ♀.

No specimens found in the MHNG collection. The whereabouts of the syntypes is unknown.

Chondrodesmus convexus Carl, 1914, Chelodesmidae

convexus Carl, 1902: 633-635, pl. 11, fig. 57 [*Pachyurus*].
Costarica, P. Biolley (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18554). One of the specimens has been placed in a vial that has been wrapped in paper with “Lectotype” written on it. One of the specimens loose in the jar is broken. Both of the identification labels

in the jar have “Costarica P. Biolley” written on them, indicating that the specimens are part of the type series. A lectotype does not seem to have been formally designated and the specimens are syntypes.

Amplinus convexus (Carl, 1902), Aphelidesmidae

coonoorensis Carl, 1932: 427-428, fig. 8 [*Orthomorpha* (*Kalorthomorpha*)].

Nilgiris: Coonoor, ca. 1600 m, XII 1926. Unter Laub, auf tiefgründigem Boden der Kaffeeplantagen und im Urwald. Unspecified number of ♂ and ♀.

The MHNG collection contains eight specimens in alcohol in two vials. One vial (MHNG-ARTO-14388) contains the lectotype designated by Jeekel (1980a: 168). The specimen has a pin running the length of the body and is accompanied by a smaller vial containing gonopods and a handwritten lectotype label. The second vial (MHNG-ARTO-14389) contains seven paralectotypes. One of the specimens has a pin running the length of the body and several other specimens are broken. This vial has the original data label with “Nilgiris, Coonoor” written on it. A handwritten note in the jar reads “*Orthomorpha coonoorensis* Carl, ♂ lectotype, 5♂ lectoparatypen + 2♀ lectoparatypen Jeekel 1976”. Jeekel (1980a) designated *Orthomorpha coonoorensis* as the type species of the genus *Parchondromorpha* Jeekel, 1980 in the original description of the genus.

Parchondromorpha coonoorensis (Carl, 1932), Paradoxosomatidae

coriacea Carl, 1902: 581-584, pl. 10, fig. 21 [*Orthomorpha*].

Java, Dr. L. Zehntner (Genfer Museum). One ♂ and one ♀.

The MHNG collection contains two specimens in alcohol in two vials. One vial (MHNG-ARTO-14401) contains the lectotype designated by Jeekel (1980b: 332). The specimen had a pin running the length of the body, but two parts of the anterior of the body have become detached. The vial also contains a smaller vial containing gonopods. A second vial (MHNG-ARTO-14402) contains a paralectotype with a pin running the length of the body. The identification labels in the jar have “Java, Zehntner and “Java, Dr L Zehntner” written on them respectively, and a handwritten label indicates that the specimens were studied by Jeekel in 1976. Jeekel (1980b) designated *Orthomorpha coriacea* as the type species of the genus *Nesorthomorpha* Jeekel, 1980 in the original description of the genus.

Nesorthomorpha coriacea (Carl, 1902), Paradoxosomatidae

costatus Carl, 1913a: 213-216, figs 8-10 [*Cyphozonus*].

Yonni, Sierra-Leone. Two juvenile ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18547). The identification labels in the jar have “♀ juv. Freetown, Sierra-Leone Volz” and

“Freetown Volz” written on them respectively. Although the locality given in the description differs from that on the label it seems almost certain that this specimen is a syntype. The other syntype is presumably in the NMBE. *Cyphozonus costatus* is the type species of *Cyphozonus* Carl, 1913 by monotypy (Jeekel, 1971).

Campodesmus costatus (Carl, 1913), Campodesmidae

crassipes Carl, 1941b: 595-598, figs 42-46bis [*Diopsiulus* (*Plusiochaeturus*)].

Nilgiris: Elkhill, 2300 m, Wald, in krümeliger Erde, I.1927. Two ♂, one ♀ and an unspecified number of juveniles.

The MHNG collection contains 33 specimens in alcohol in three vials. The first vial (MHNG-ARTO-14455) contains two specimens in a smaller vial and labels with “*Diopsiulus* IV Elkhill” and “*Diopsiulus crassipes* Carl, type ♂ et cotype ♂, Elkhill” written on them. The second vial (MHNG-ARTO-14456) contains one specimen and a label with “*Diopsiulus crassipes* Carl, ♀ type, Elkhill I.27” written on it. The third vial (MHNG-ARTO-14457) contains 30 specimens, several of them broken, and a label with “*Diopsiulus crassipes* Carl, Elkhill, Juvs.” written on it. There are also three microscope slides preparations of parts of syntypes: 1) a slide (MHNG-ARTO-14458) with ♂ legs, gnathochilarium and antenna; 2) slide (MHNG-ARTO-14459) with gonopods and legs of both ♂; 3) a slide (MHNG-ARTO-14460) with the second and third legs of the ♀. Despite the label in the first tube, no holotype designation was made in the original description and all of these specimens are syntypes.

Stemmiulus crassipes (Carl, 1941), Stemmiulidae

crassipes Carl, 1909a: 253-255, fig. 19 [*Platyrrhacus*]. Borneo. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Hoplurorhachis crassipes (Carl, 1909), Platyrrhacidae

crepuscularis Carl, 1932: 514-517, figs 161-169 [*Skotodesmus*].

Palnis: Bombay-Shola, bei Kodaikanal, 2200 m, 21.III, unter Holz; Akazienwäldchen oberhalb Pumbarai, 2000 m, 29.III, unter Holz; Mariyan-Shola, 2300 m, 11.-14.IV, unter Holz; Shola bei Maryland, Neutral-Saddle, 1600 m, 20.IV. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains 14 specimens in alcohol in three vials. The first vial (MHNG-ARTO-18618) contains specimens from two localities separated by a plug of cotton wool; one specimen with a data label with “Bombay-Shola près Kodaikanal” written on it and two specimens with a data label with “Shola a Maryland” written on it. The second vial (MHNG-ARTO-18619) contains specimens from two localities separated by a cotton wool plug; two specimens with a data label with “Bombay-Shola près Kodaikanal” written on it and nine

specimens, two of them broken, with a data label with “Pumbarai, bosquet d’acacias 29.III.” written on it. The third vial (MHNG-ARTO-18620) contains a smaller vial of dissected parts and an identification label with “gonopodes, pattes, antennes” written on it. The data labels indicate that all of these specimens are syntypes. *Skotodesmus crepuscularis* is the type species of the genus *Skotodesmus* Carl, 1932 by monotypy (Jeekel, 1971).

Skotodesmus crepuscularis Carl, 1932, Pyrgodesmidae

crepuscularis debilis Carl, 1932: 517, fig. 162 [*Skotodesmus*].

Palnis: Kaffee-Plantage bei Kukkal, 1850 m, 2.IV. More than one specimen.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18621). The data label has “Palnis, Kaffee-Plant. près de Kukkal” written on it, indicating that the specimens are syntypes.

A junior synonym of *Skotodesmus crepuscularis* Carl, 1932, Pyrgodesmidae

cuisinieri Carl, 1917: 392-395, figs 12-15 [*Thyropygus*]. Tay Ninh, Cochinchine (L. Cuisinier leg.). One ♂.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-21296). There is also a vial containing gonopods. There is a locality label with “Tay Ninh Cochinchine” written on it. The identification labels in the jar have “Tay Ninh (Cochinchine) Cuisinier leg.” and “Type! Cochinchine Cuisinier” written on them. The ♂ specimen is the holotype, the two ♀ specimens, one of which is broken into two parts, are not types. A revision of the species based on the holotype was published in 2011 (Pimvichai *et al.*, 2011).

Thyropygus cuisinieri Carl, 1917, Harpagophoridae

cylindrica Carl, 1935: 334-336, figs 15-19 [*Akribosoma*]. Darjeeling (Sikkim) III. Unspecified number of ♂ and ♀. The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18556). Both specimens have a pin running the length of the body. They are placed in a vial with a label with “*Akribosoma cylindrical* Carl, ♂♀ cotypes, Darjeeling 7000’ Everest Exp.” written on it. The identification labels in the jar both have “♂♀ cotypes Himalaya mérid.” written on them and the specimens are thus syntypes. There are further syntypes in the BMNH. *Akribosoma cylindricum* is the type species of the genus *Akribosoma* Carl, 1935 by monotypy (Jeekel, 1971).

Anoplodesmus cylindricus (Carl, 1935), Paradoxosomatidae

debilis Carl, 1914b: 848-849, figs 45-48 [*Stemmatoiulus*]. La Camelia, Kaffeepflanzung bei Angelopolis, 1800 m. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Stemmiulus debilis (Carl, 1914), Stemmiulidae

debilitata Carl, 1914b: 920, figs 166-167 [*Trichomorpha*].
La Camelia bei Angelopolis. One ♂.

No specimens found in the MHNG collections. The whereabouts of the holotype is unknown.

Trichomorpha debilitata Carl, 1914, Chelodesmidae

decoratum Carl, 1912c: 118-119, text fig. 7 [*Castanotherium*].

Loka und Umgebung, bis 1300 m ü. M., am Pik von Bonthain, Süd-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

No specimens found in the MHNG. There are two syntypes (one ♂ and one ♀ referred to as "Typen" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00118a).

Castanotherium decoratum Carl, 1912, Zephroniidae

dempuranus Carl, 1912d: 512-513, pl. 9, figs 8,10-11 [*Rhinotus*].

Dempuran, Java. Dr. L. Zehntner. Unspecified number of ♂ and ♀.

The MHNG collection contains 18 specimens in alcohol (MHNG-ARTO-18451). The vial containing the specimens has two labels, one with "Dempuran 28. Nov. 96" written in pencil and the other with "Zehntner Java" printed on yellow paper. The identification label in the jar has "♂♀ Java (Dempuran) Zehntner" written on it, and the specimens are syntypes.

Rhinotus dempuranus Carl, 1912, Siphonotidae

dentata Carl, 1932: 428-431, figs 9-13 [*Orthomorpha* (*Kalorthomorpha*)].

Nilgiris: Coonoor, ca. 1600 m, unter Laub, auf tiefgründigem Boden der Pflanzungen am alten Nilgiriweg. XII.26. Unspecified number of ♂.

The MHNG collection contains three specimens in alcohol in two jars. The first (MHNG-ARTO-14390) contains the lectotype designated Jeekel (1980a: 170). The specimen is in a vial and has a pin running the length of the body, and it is accompanied by a smaller vial containing the gonopods. The vial has the original identification and data labels, the latter with "Nilgiris, Coonoor" written on it. The jar contains a handwritten label indicating that Jeekel studied the specimens in 1976. The second jar (MHNG-ARTO-14391) contains two paralectotypes, one of them broken in two. These specimens are accompanied by copies of the original labels. Jeekel (1980a: 170) designated *Orthomorpha dentata* as the type species of *Harpagomorpha* Jeekel, 1980 in the original description of the genus.

Harpagomorpha dentata (Carl, 1932), Paradoxosomatidae

denticulata Carl, 1914b: 926-927, figs 181-183 [*Trichomorpha*].

La Camelia, bei Angelopolis. One ♂ and one juvenile.

No specimens found in the MHNG collection. The whereabouts of the type specimens is unknown.

Trichomorpha denticulata Carl, 1914, Chelodesmidae

detruncata Carl, 1905: 280-282, figs 11-11d [*Odontopyge*].

Guinée espagnole. Unspecified number of ♂.

No specimens found in the MHNG collection. Andrés Cobeta (2001) did not locate any type specimens in the MNCN.

Rhamphidarpe detruncata (Carl, 1914), Odontopygidae

dilatatus Carl, 1905: 264-267, figs 3-3b [*Cordyloporus*].
Cabo St Juan. Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18532). The identification labels in the jar have "Cabo St Juan, Guinée-espagnole" and "Guinée-espagnole" written on them respectively, indicating that the specimen is a syntype. Another handwritten label in the jar states that Hoffman selected the specimen as lectotype in 1960, but it does not appear that the designation was ever formally published. According to Andrés Cobeta (2001: 67) there is another syntype in the MNCN (MNCN 20.07/1180).

Paracordyloporus dilatatus (Carl, 1905), Chelodesmidae

dimidiatus Carl, 1926: 418-419, figs 70-72 [*Spirobolellus*].

Neu-Caledonien: Koné, Station am Koné-Fluss, Aug. 1911; Tiouaka-Tal, Aug. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-14323). The identification label has "Kone-Fluss-Station 18.8.11" written on it, indicating that the specimens are syntypes. There are several syntypes (♂ and ♀ referred to as "Typen" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00359a and NMB-DIPL-00359b).

Spirobolellus dimidiatus Carl, 1926, Spirobolellidae

dimorphum Carl, 1913a: 204-206, figs 2-3 [*Strongylosoma*].

Yonni, Sierra-Leone. Unspecified number of ♂ and ♀.

The MHNG collection contains 12 specimens in alcohol (MHNG-ARTO-18561). One of the specimens has a pin running the length of the body and one of them is broken. They are accompanied by a vial holding gonopods. The original identification labels in the jar have "Yonni (Sierra Leone) W. Volz" and "Sierra leone Volz" written on them respectively, indicating that the specimens are syntypes. The other syntypes are presumably in the NMBE.

A junior synonym of *Xanthodesmus physkon* (Attems, 1898), Paradoxosomatidae

dimorphus Carl, 1909b: 362-365, pl. 7, figs 31-34 [*Trigoniulus*].

Daressalam. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14439). The specimens are all broken and are accompanied by four vials, one containing anterior gonopods, one containing a complete set of gonopods, one with a partially dissected head and one with a pair of legs with vulvas. The identification labels in the jar both have “Daressalam Dr J. Carl” written on them, indicating that the specimens are syntypes. *Trigoniulus dimorphus* was designated as the type species of the genus *Parabolus* Enghoff, 2011 in the original description of the genus.

Parabolus dimorphus (Carl, 1909), Pachybolidae

dispersa Carl, 1909b: 332-333, pl. 8, figs 53, 61-62 [*Odontopyge*].

Njarugenje-Niansa (Central-Ruanda); Misoroti-Chiavitembe (Ost-Ussuwi). Two ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18486). Both of the specimens are reinforced with pins, one of them is broken into three pieces. There is a small vial with dissected parts including gonopods. The identification labels in the jar have “Njarugenje-Niansa Ruanda Dr J. Carl” and “types! Ruanda central Dr. J. Carl” written on them respectively, indicating that the specimens are syntypes.

Geotypodon dispersus (Carl, 1909), Odontopygidae

dispersus Carl, 1926: 426-428, figs 87-89 [*Spirobolellus*]. Neu-Caledonien: Pam, Juli 1911; Oubatche, März 1911; Insel Ouedjo bei Hienghène, 5. Juni 1911; Touo, Aug. 1911; Koné, Aug. 1911; Tiouaka-Tal, 23. Aug. 1911; Bourail; Ngoï-Tal, 200 m, 16. Sept. 1911; Yaté, März 1912; Prony, März 1912. Loyalty-Inseln: Ouvéa, Fayaoué, Mai 1912; Lifou, Képénéé und Naltho, April 1912; Maré, Nétché und Médou, Dez. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains 15 specimens in alcohol in two vials. The first (MHNG-ARTO-14330) contains six specimens, one with a pin running the length of the body. The data label has “Drs F. Sarasin & J. Roux, N. Caled., Tao 24 Juni 1911” written on it. The second (MHNG-ARTO-14331) contains nine specimens, two of them broken. The data label has “Drs F. Sarasin & J. Roux, N. Caled., Naltho, Lifou” written on it. The specimens are presumably all syntypes even though the data in the first tube does not correspond to the localities given in the original description. There are 27 syntypes (referred to as “Typen” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00364a to NMB-DIPL-00364o).

Spirobolellus dispersus Carl, 1926, Spirobolellidae

distinctum Carl, 1912c: 106-109, pl. 6, figs 37-40 [*Castanotherium*].

Ussu, Südost-Celebes (coll. Sarasin). One ♂.

No specimens found in the MHNG. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00112a).

Castanotherium distinctum Carl, 1912, Zephroniidae

distinctus Carl, 1917: 388-390, figs 7-9 [*Poratophilus*]. Elizabethville (Katanga, Haut-Congo). One ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14251). The specimens are accompanied by a vial containing gonopods. The identification labels have “Elizabethville (Katanga) Haut-Congo” and “Afrique mérid. type!” written on them respectively. The ♂ is the holotype, the ♀ was only mentioned in the original description as doubtfully conspecific and cannot be considered a type.

Zinophora distincta (Carl, 1917), Harpagophoridae

domesticus Carl, 1909b: 359-360 [*Microspirobolus*].

Bukoba, in einer Eingeborenenhütte. Unspecified number of ♀ and one juvenile ♂.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14419). Two specimens have pins running the length of the body and are in a small vial, the others are loose in the jar. The identification labels both have “Bukoba J. Carl” written on them and there is a printed “Type” label indicating that the specimens are syntypes. There are two syntypes in the ZMUH (Weidner, 1960).

Brachyspirobolus domesticus (Carl, 1909), Pachybolidae

dorsalis Carl, 1909b: 341-342, pl. 7, fig. 45 [*Odontopyge*]. Kiwamba in Süd-Karagwe; Biaramuli (Ost-Ussuwi) bis zum Sultanat Ihangiro, sehr häufig; Bukoba. Unspecified series.

The MHNG collection contains four specimens in alcohol in two vials. One vial (MHNG-ARTO-18487) contains two specimens, one of them with a pin running part of the length of the body, and some dissected gonopods. The other vial (MHNG-ARTO-18488) contains two specimens, one of them with a pin running most of the length of the body and a label with “Misorote-Chiarotembe 14.xi.08” written in pencil. The labels in the jar have “Biaramuli Odontopyge”, “Biaramuli (ost. Ussuwi) J. Carl” and “types! Ost-Ussuwi J. Carl” written on them respectively, indicating that the specimens are syntypes. There are two syntypes in the ZMUH (Weidner, 1960).

Haplothysanus dorsalis (Carl, 1909), Odontopygidae

dorsosulcata Carl, 1909b: 350-352, pl. 8, figs 55-56 [*Odontopyge*].

Bukoba; Biaramuli (Ost-Ussuwi); Kagera, durch Südkaragwe bis Mabira. Unspecified number of ♂ and ♀.

The MHNG collection contains 36 specimens in alcohol in three jars. One jar (MHNG-ARTO-18489) contains 20 specimens, two of them separated into a vial with their dissected gonopods. Three of the specimens have pins running part of the length of the body and several are broken. The identification labels in the jar have “Biaramuli (Ost-Ussuwi) Dr J. Carl” and “types O.-Ussuwi J. Carl” written on them respectively,

indicating that the specimens are syntypes. An undated typewritten note in the jar states that Hoffman identified the specimens as *Rhamphidarpina* [sic] *dorsosulcata*. The second jar (MHNG-ARTO-18490) contains parts of at least 14 specimens, most of them broken. The identification labels in the jar are not original and have “Bukoba” typed on them, suggesting that the specimens are syntypes. The third jar (MHNG-ARTO-18491) contains two specimens, each with a pin running the length of the body. The identification labels in the jar have “Odontopyge dorsosulcata?” written on them, and “Jinja (Busoga) Dr J. Carl” and “Jinja Dr J. Carl” written on them respectively. Given the uncertain identification, these specimens are not considered syntypes. There are three syntypes in the ZMUH (Weidner, 1960) and three in the MCZL.

Rhamphidarpe dorsosulcata (Carl, 1909), Odontopygidae

dorsovittatus Carl, 1914b: 895-896 [*Chondrodesmus*].

Buenavista, Kaffeepflanzung bei Viota, 1000 m ü. M. One ♀.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Chondrodesmus dorsovittatus Carl, 1914, Chelodesmidae

dravidus Carl, 1932: 447-449, figs 35-39 [*Xiphidiogonus*]. Nord-Travancore: Oberes Vattavadi-Tal, zwischen Anaimalais und Palnis, in Urwald, ca. 1850 m, 10.IV. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14252). The specimen is in a glass vial inside a larger tube, and has a pin running the length of the body. A second small vial contains the gonopods and antenna. The data label has “Travancore Vattavadi” written on it and the identification label has “♂ type” written on it, indicating that the specimen is the holotype. *Xiphidiogonus dravidus* Carl, 1932, Paradoxosomatidae

ducalis Carl, 1926: 452-455, figs 140-142 [*Rhinotus*].

Neu-Caledonien: Coulé-Boréaré, 6. Febr. 1912; Tchalabel, unter Kalkblöcken, 5. Mai 1911; Yaté, 23. März 1912; Mt. Canala, 700 m, Sept. 1911; Mt. Ignambi, April 1911. Loyalty-Inseln: Maré, Nétché, Dez. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-14343). The identification labels in the jar both have “Ignambi, N. Caled. Sarasin & Roux” written on them, indicating that the specimens are syntypes. There are nine syntypes (♂, ♀ and juveniles referred to as “Typen” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00382a to NMB-DIPL-00382f).

Rhinotus ducalis Carl, 1926, Siphonotidae

duplus Jeekel, 2001: 13 [*Spirobolellus*].

Replacement name for *Spirobolellus solitarius* Carl, 1926, a junior homonym of *S. solitarius* Carl, 1912.

Spirobolellus duplus Jeekel, 2001, Spirobolellidae

dysoni Carl, 1941b: 616-618, figs 67-68, 71-73 [*Aulacobolus*].

Nilgiris: Coonoor, am alten Nilgiriweg, in Laubmoder, ca. 1600 m; Hill-grove Estate, ca. 1500 m, unter morschen Strünken, I.1927. Unspecified number of ♂ and ♀.

The MHNG collection contains ten specimens in alcohol (MHNG-ARTO-14424). The specimens are accompanied by three vials, two containing partially dissected heads and the other gonopods. The data label has “Coonoor, Nilgiris, I.27” written on it in pencil, indicating that the specimens are syntypes. There are also two microscope slide preparations of parts of syntypes: 1) a slide (MHNG-ARTO-14425) with posterior gonopods and 2) a slide (MHNG-ARTO-14426) with the first three pairs of legs of a ♂.

Aulacobolus dysoni Carl, 1941, Pachybolidae

ejaculans Carl, 1941b: 620-621, figs 69, 76-79 [*Aulacobolus*].

Anaimalais: Shola am Berg ob Resthouse Attakatti, ca. 1200 m, unter Borke, 26.II; Valparai, Hügel ob Naduar-Estate, ca. 1300 m, frische Waldlichtung, unter Holz, 9.III. Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol in two jars. One jar (MHNG-ARTO-14427) contains five specimens and a data label with “Shola am Ibex-Hill bei Attakatti 26.II, unter faulen Stämmen” written on it, indicating that the specimens are syntypes. The other jar (MHNG-ARTO-14428) contains a single specimen with the head detached and a small vial with gonopods. The data label has “Hügel ob Nadu-Ar-Estate, frische Waldlichtung, unter Holz 9.III. Valparai Anaimalais” written on it, indicating that the specimen is a syntype. There is also a microscope slide preparation (MHNG-ARTO-14429) with the posterior gonopods and the first three pairs of legs of one of the syntypes.

Aulacobolus ejaculans ejaculans Carl, 1941, Pachybolidae

ejaculans vallensis Carl, 1941b: 621-622, fig. 80 [*Aulacobolus*].

Travancore: Grosser Wald im oberen Vattavadai-Tal, ca. 1850 m. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14430). The specimens are accompanied by a small vial containing a partially dissected head and some pairs of legs. The data label has “Grosser Wald im oberen Vattavadai-Tal (Travancore) 10.IV” written on it, indicating that these are the syntypes of the subspecies *vallensis*, even though the identification labels only have “*Aulacobolus ejaculans*” written on them. There is also a microscope slide preparation of a pair of posterior gonopods (MHNG-ARTO-14431) labelled “*Auloc. ejaculans* subsp. ♂ Vattavadai” and thus part of one of the syntypes.

Aulacobolus ejaculans vallensis Carl, 1941, Pachybolidae

elberti Carl, 1912c: 142-144, pl. 5, fig. 12 [*Polylepis*].
Roembi-Mengkoka, SO.-Celebes (Dr. J. Elbert).
Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18550). The specimen has a pin running the length of the body and the head and anterior segments are detached. The identification labels in the jar have “♂ cotype S. E. de Celebes ex coll. Elbert” and “♂ cotype S. E. de Celebes” written on them respectively, indicating that the specimen is a syntype. The SMF collection contains three specimens in alcohol, two ♂, each with a single gonopod missing, and one ♀. The identification label in the jar has “Lombok, Sadjang, leg. Elbert 1909” written on it, indicating that these specimens are types. After examination of these type specimens, one ♂ (SMF 732) was placed in a separate jar and is here designated as lectotype.

Polylepis elberti Carl, 1912, Platyrrhacidae

elberti Carl, 1912b: 170-171, figs 3-4, text figs D-E [*Rhinocricus*].

Lombok. Sadjang. Dr. J. Elbert. Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol (MHNG-ARTO-18455). The specimens each have a pin running the length of the body. The identification labels in the jar have “Lombok (Sadjang) ex. coll. J. Elbert” and “Lombok Coll. Elbert types!” written on them respectively, indicating that the specimens are syntypes. The SMF collection contains more than seven specimens in alcohol (SMF 1861) under the name *Eurhinocricus elberti*. The identification label has “Lombok, Sadjang, Elbert, 1909” written on it, indicating that these are syntypes. *Rhinocricus elberti* Carl was designated as the type species of the genus *Carlocricus* Jeekel, 2001 in the original description of the genus.

Carlocricus elberti (Carl, 1912), Rhinocricidae

elegans wroughtoni Carl, 1941b: 634-637, figs 96-99 [*Glyphiulus* (*Podoglyphiulus*)].

Kanda, bei Bombay. Major Wroughton leg. 1893 (British Museum). One ♂.

The MHNG collection contains a microscope slide preparation (MHNG-ARTO-18513) with gonopods with “*Glyphiulus elegans* Silv. ssp. *wroughtoni* Carl” and “Gonopoden und Ersatzgonopoden” written on the labels. These are obviously part of the holotype; the rest of the specimen is in the BMNH.

Podoglyphiulus elegans wroughtoni (Carl, 1941), Cambalopsidae

emini Carl, 1909b: 344-346, pl. 7, figs 41-42 [*Odontopyge*].

Bukoba, in Gebüsch und Bananengärten; Sultanat Ihangiro. Unspecified number of ♂.

The MHNG collection contains 50 specimens in alcohol

in three jars. The first jar (MHNG-ARTO-18492) contains 21 specimens, four broken and three reinforced with pins. The identification labels in the jar have “Bukoba J. Carl” and “types! Bukoba J. Carl” written on them respectively, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18493) contains parts of at least 21 specimens, many of them broken and three of which are reinforced with pins. There is a data label with “Bukoba IX.08” written in pencil, and the original identification label in the jar has “Bukoba J. Carl” written on it, indicating that the specimens are syntypes. An undated typewritten label in the jar states that Hoffman identified these specimens as *Haplothysanus emini*. The third jar (MHNG-ARTO-18494) contains seven specimens, three of them broken and three reinforced with pins. There is a vial with dissected parts including gonopods. The identification labels in the jar have “Ihangiro J. Carl” and “Ihangiro Dr J. Carl” written on them respectively, indicating that the specimens are syntypes. There are three syntypes in the ZMUH (Weidner, 1960), four in the MCZL, three in the ZMHB (Moritz & Fischer, 1974) and three ♀ (referred to as “Paratypoide” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00182a).

Haplothysanus emini (Carl, 1909), Odontopygidae

eremita Carl, 1935: 337-340, figs 20-25 [*Hingstonia*].

Rongshar-Valley (Nepal), 24.VI. Two ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18591). The specimen is broken and placed in a vial that is accompanied by another vial containing gonopods. A label in the large vial that contains the smaller one has an identification label with “♂ cotype Rongshar Valley, 11500', III Everest-Exp.” written on it, indicating that the specimen is a syntype. The other syntypes are in the BMNH. *Hingstonia eremita* is the type species of the genus *Hingstonia* Carl, 1935 by monotypy (Jeekel, 1971).

Hingstonia eremita Carl, 1935, Fuhrmannodesmidae

eremita Carl, 1912c: 102-103 [*Nesoglomeris*].

Bowanglangi, 1200-1500 m. ü. M., Süd-Celebes (coll. Sarasin). One ♀.

No specimens found in the MHNG. The ♀ holotype is in the NMB (inventory number NMB-DIPL-00110a).

Hyleoglomeris eremita (Carl, 1912), Glomeridae

eremitus Carl, 1932: 504, fig. 140 [*Pagodesmus*].

Upper-Palnis: Bombay-Shola, bei Kodaikanal, 2200 m. One juvenile ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14231). The specimen is broken into two pieces. The identification label has “type Kodaikanal” written on it, indicating that the specimen is the holotype.

Pagodesmus eremitus Carl, 1932, Pyrgodesmidae

eremitus Carl, 1941b: 674-677, figs 166-170 [*Thyropygus*].

Nilgiris: Coonoor, 26.XII.1926. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14233). The data label has "Coonoor, 26.XII" written on it and the identification labels have "type" written on them, indicating that the specimen is the holotype. Most of the specimen is in a glass vial, with the head and anterior body rings, and the gonopods in separate, smaller vials.

Gnomognathus eremitus (Carl, 1941), Harpagophoridae

errabundus Carl, 1941b: 711-714, figs 224-227 [*Glyphiulus* (*Podoglyphiulus*)].

Untere Palnis: Tandikudi, ca. 1500 m, auf Wegmauer, nach Regen. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14232). The locality label has "Tandikudi, 26.IV nach Regen, in Mauern, unter den oberen Steinen" written on it and the identification labels have "type" written on them, indicating that the specimen is the holotype. Most of the specimen is in a small vial placed in a larger tube along with a second small vial containing the anterior body rings and gonopods. There are also two microscope slide preparations of parts of the holotype: 1) a slide (MHNG-ARTO-18514) with gonopods with a label with "Glyphiulus errabundus Carl ♂ type Gonopodes" written on it; 2) a slide (MHNG-ARTO-18515) with legs with a label with "Glyphiulus errabundus Carl ♂, Tandikudi, type Pattes 1, 2° et 3°".

Podoglyphiulus errabundus Carl, 1942, Cambalopsidae

escalerae Carl, 1905: 273, fig. 7 [*Trichozonus*].

Cabo St Juan. Unspecified number of ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14230). The identification labels have "♀ Guinée espagnole" written on them, indicating that the specimens are syntypes. According to Andrés Cobeta (2001: 68) there is another syntype in the MNCN (MNCN 20.07/1190). *Trichozonus escalerae* is the type species of the genus *Trichozonus* Carl, 1905 by monotypy (Jeekel, 1971).

Trichozonus escalerae Carl, 1905, Fuhrmannodesmidae

exiguus Carl, 1932: 483-484, figs 98-102 [*Kukkalodesmus*].

Palnis: Kukkal-Shola, ca. 1900 m, 1.IV, unter faulem Holz. One ♂ and two ♀.

The MHNG collection contains seven specimens in alcohol (MHNG-ARTO-18592). Three of the specimens are broken, and they are accompanied by a vial containing fragments of dissected parts. The data label has "Kukkalshola (Palnis)" written on it, indicating that the syntypes are amongst the specimens. It is not obvious if the other specimens were excluded from the type series because they are juveniles or for some other reason. *Kukkalodesmus exiguus* is the type species of the genus

Kukkalodesmus Carl, 1932 by monotypy (Jeekel, 1971). *Kukkalodesmus exiguus* Carl, 1932, Fuhrmannodesmidae

exiguus Carl, 1926: 443-444, figs 125-126 [*Spirobolellus*].

Neu-Caledonien: Mt. Canala, 17. Sept. 1911. One ♂.

No specimens found in the MHNG. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00376a).

Spirobolellus exiguus Carl, 1926, Spirobolellidae

exilis Carl, 1914b: 860-862, figs 69, 71-75 [*Epinannolene*]. Medellin, 1600 m. Unspecified number of ♂ and ♀.

The MHNG collection contains eight specimens in a vial in alcohol (MHNG-ARTO-18465). A second vial (MHNG-ARTO-18466) contains dissected parts including gonopods. The identification labels in the jar have "Colombie Fuhrmann" and "Colombie Fuhrmann leg." written on them respectively, indicating that the specimens are syntypes. There are five syntypes (one ♂ and four ♀ referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00212a).

Epinannolene exilis Carl, 1914, Pseudonannolenidae

expulsus Carl, 1926: 442-443, figs 122-124 [*Spirobolellus*].

Loyalty-Inseln: Ouvéa, Fayaoué, Mai 1912; Lifou, Nathaló, April 1912; Maré, Néthché, Dez. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14338). The identification label has "Nathaló Lifou" written on it, indicating that the specimens are syntypes. There are six syntypes (three ♂ and three ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00375a, NMB-DIPL-00375b and NMB-DIPL-00375c).

Spirobolellus expulsus Carl, 1926, Spirobolellidae

fallax Carl, 1926: 435, figs 106-108 [*Spirobolellus*].

Neu-Caledonien: Oubatche, Wald, in faulem Holz, 600 m, April 1911; Mt. Canala, Wald bei 800-1000 m, Sept. 1910. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14324). The identification label has "Kanala [sic] 800-1000 m" written on it, indicating that the specimens are syntypes. There are four syntypes (two ♂ and two ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00369a and NMB-DIPL-369b).

Spirobolellus fallax Carl, 1926, Spirobolellidae

fasciata Carl, 1905: 282-284, fig. 10 [*Odontopyge*].

Corisco. One ♀.

No specimens found in the MHNG. According to Andrés Cobeta (2001: 70) the holotype is in the MNCN (MNCN 20.07/1171). *Odontopyge fasciata* Carl, 1905 is a junior

homonym of *O. fasciata* Attems, 1896. The replacement name *Odontopyge johanncarli* is proposed here for *O. fasciata* Carl, 1905.

Odontopyge johanncarli **nom. nov.**, Odontopygidae

fastidiosus Carl, 1926: 397-398, figs 42-43 [*Canacophilus* (*Canacophilus*)].

Neu-Caledonien: Wald oberhalb Oubatche, 600 m, April 1911, in faulem Holz. One ♂, one ♀ and one juvenile.

No specimens found in the MHNG. The three syntypes (one ♂, one ♀ and one juvenile ♂ referred to as "Typus" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00350a).

Canacophilus fastidiosus Carl, 1926, Dalodesmidae

faucium fulvosignata Carl, 1918: 444 [*Dinematocricus*].

Nouvelle Guinée. L. Biro leg. Musée national hongrois. Six specimens, sex not given.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18453). The identification labels in the jar have "Nouv. Guinée, L. Biro" written on them, indicating that the specimen is a syntype. The other syntypes are presumably in the HNMH.

A junior synonym of *Dinematocricus faucium* Brölemann, 1913, Rhinocricidae

fecundus Carl, 1912b: 164-165, fig. 7 [*Platyrrhacus*].

Lombok. Sadjang 1000-1600 m, viele Exemplare, Sapit 680 m 1 ♂ (Dr. Elbert). Unspecified number of ♂ and ♀. The MHNG collection contains 13 specimens in alcohol in two jars. One jar (MHNG-ARTO-15121) contains nine specimens, each with a pin running the length of the body, and a glass vial containing the lectotype designated by Hoffman (1965: 878) (MHNG-ARTO-15122). The second jar (MHNG-ARTO-15123) contains three broken specimens. The identification labels in the first jar have "Lombok, coll. Elbert, types!" and "Sadjang (Lombok), Dr. Elbert leg" written on them respectively, and that in the second jar has "Sadjang, Lombok" written on it. All of these specimens are part of the type series, and apart from the lectotype are paralectotypes. The SMF collection contains 49 specimens in alcohol in four jars (SMF 842-SMF 845) from Sadjang and Sapit which are paralectotypes. There are two ♀ paralectotypes in the ZMHB (Moritz & Fischer, 1978a). One specimen was listed in the accession catalogue of the MTD (No. 389) but this was destroyed during the Second World War. Hoffman (1965) designated *P. fecundus* as the type species of *Sundarhacus* Hoffman, 1965 in the original description of the genus.

Sundarhacus fecundus (Carl, 1912), Platyrrhacidae

flavosignatus Carl, 1909b: 307-309, pl. 6, fig. 15 [*Euryzonus*].

Vom Kagera bis Njarowungo in Ost-Ussuwi, im Busch, nach Regen häufig den Karawanenfussweg kreuzend. Unspecified number of ♂ and ♀.

The MHNG collection contains eight specimens in alcohol in two jars. The first jar (MHNG-ARTO-18545) contains seven specimens, three with a pin running the length of the body. They are accompanied by a vial containing gonopods. Both of the identification labels in the jar have "Süd. Kagera J. Carl" written on them, indicating that the specimens are syntypes. An undated label has "selon HOFFMAN: Gomphodesmidae, Emphysemastix flavosignatus (Carl)" typewritten on it. The second jar (MHNG-ARTO-18546) contains one specimen. The labels in the jar are typewritten and have "Kagera-Mabira, Pori 4-5.XI.08" and "Kagera" written on them, suggesting that this specimen is also a syntype. There are two syntypes in the ZMUH (Weidner, 1960), three in the MCZL, two in the NMB (inventory number NMB-DIPL-00173a) and two in the ZMHB (Moritz & Fischer, 1978a).

Aulodesmus flavosignatus (Carl, 1909), Gomphodesmidae

fossiger silvestre Carl, 1909b: 300, pl. 6, figs 11-12 [*Strongylosoma*].

Urwaldparzelle bei Bukoba, unter Laub. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains ten specimens in alcohol in two jars. The first jar (MHNG-ARTO-18564) contains five specimens; two have pins running the length of the body and are placed in individual vials, one is broken and placed in a vial with a smaller vial containing gonopods and the other two specimens are in a fourth vial. The identification labels in the jar have "Urwäldchen bei Bukoba" and "types Bukoba Dr J. Carl" written on them respectively, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18565) contains five specimens in a single vial; two of the specimens are broken. The vial contains an original identification label with "Bukoba Carl" written on it, indicating that the specimens are syntypes. There are two syntypes in the ZMUH (Weidner, 1960) and two in the MCZL.

Eviulisoma silvestre (Carl, 1909), Paradoxosomatidae

fossiger typica Carl, 1909b: 296-299, pl. 6, figs 7-14 [*Strongylosoma*].

Sultanat Ihangiro, in Bananenpflanzungen, unter Blättern und Bananenstämmen. Bukoba auf Steinblöcken unter Laub. Unspecified number of ♂ and ♀.

The MHNG collection contains 63 specimens in alcohol in two jars. The first jar (MHNG-ARTO-18562) contains parts of at least 17 specimens; five have pins running the length of the body and most are broken. One specimen has been separated in a vial along with a smaller vial containing gonopods. The identification labels in the jar have "♂♀ types Bukoba u. Ihangiro" and "types Bukoba et Ihangiro Dr J. Carl" written on them respectively, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18563) contains parts of at least 46 specimens; two have a pin running the length of the body and many are badly broken. There is an

original identification label with “Ihangiro” written on it, indicating that the specimens are syntypes. There are three syntypes in the ZMUH (Weidner, 1960), three in the ZMHB (Moritz & Fischer, 1978a) and three in the MCZL. The description and some of the old labels refer to “*S. fossiger* var. *typica*” but it could be argued that this indicates that the taxon is the nominal subspecies rather than being an available name.

Eviulisoma fossiger fossiger (Carl, 1909), Paradoxosomatidae

fossiger ussuwense Carl, 1909b: 299-300, pl. 6, figs 8-10 [*Strongylosoma*].

Sultanat Ost-Ussuwi im Süden der Residentur Bukoba. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains 35 specimens in alcohol in two jars. The first jar (MHNG-ARTO-18566) contains 17 specimens; six have pins running the length of the body and are placed in individual vials, one is broken and placed in a vial with a smaller vial holding gonopods, and ten specimens, two of which are broken, are placed in the eighth vial. One of the original identification labels in the jar has “types Ussuwe J. Carl” written on it, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18569) contains 18 specimens; three have pins running the length of the body and five are broken. The labels in the jar are not original and have “Mabira” typewritten on them suggesting that these specimens are not syntypes. There are two syntypes in the ZMUH (Weidner, 1960) and three in the MCZL.

A junior synonym of *Eviulisoma fossiger* (Carl, 1909), Paradoxosomatidae

frater Carl, 1932: 511-512, figs 156-160 [*Propyrgodesmus*].

Nilgiris: Coonoor, gegen Lady Cunnings-Seat, ca. 1700 m, in Erde und unter Laub, sehr feucht, 29.XII. Unspecified number of ♂ and ♀.

The MHNG collection contains ten specimens in two jars. The first jar (MHNG-ARTO-18616) contains one broken specimen. The data label has “Coonoor, 29.XII.26” written on it. The identification label has “♂ type” written on it, but no holotype was designated in the original description and the specimen is a syntype. The second jar (MHNG-ARTO-18617) contains nine specimens, some of them broken, and a small vial with fragments of dissected parts. The identification label has “Coonoor” written on it, indicating that the specimens are syntypes.

Propyrgodesmus frater Carl, 1932, Pyrgodesmidae

frater Carl, 1909a: 267-269, fig. 20 [*Spirostreptus* (*Thyropygus*)].

Java, Coll. Zehntner, Genfer Museum; Sumatra, Coll. W. Morton. Unspecified number of ♂ and ♀.

The MHNG collection contains eight specimens in alcohol (MHNG-ARTO-18485). Four of the specimens

are reinforced with pins and five are broken. There is also a vial with gonopods. Both of the identification labels in the jar have “Java Dr. L. Zehntner” written on them, indicating that the specimens are syntypes. There are two syntypes collected by Morton in the MCZL.

Gonoplectus frater (Carl, 1909), Harpagophoridae

fraternus Carl, 1902: 655-656, pl. 11, fig. 71 [*Platyrrhacus*].

Costarica, San José und Port Limon, P. Biolley (Genfer Museum). Four ♂ and three ♀.

The MHNG collection contains six specimens in two jars. The first jar (MHNG-ARTO-14228) contains three ♂ and a vial containing gonopods. The identification label has “Costarica, St. José, Port Limon, P. Biolley” written on it and there is a label dated 1960 indicating that Hoffman intended to designate the dissected ♂ as the lectotype. The second jar (MHNG-ARTO-14229) contains three ♀ and the identification label has “Costarica, St. José, Port Limon, P. Biolley” written on it. The lectotype designation was not published (Hoffman, 1999) and all of the specimens are syntypes. The other ♂ syntype (referred to as “Syntyp” in the NMB catalogue) is in the NMB (inventory number NMB-DIPL-00442a).

Nyssodesmus fraternus (Carl, 1902), Platyrrhacidae

fuhrmanni Carl, 1914b: 947-948, figs 207-210 [*Cryptogonodesmus*].

Tambo, ca. 2000 m. Unspecified number of ♂ and ♀.

The MHNG collection contains some dissected parts in alcohol (MHNG-ARTO-18588). A label in the vial containing the parts has “♂ Gonop., Ant, Bein 2, ocb.” written on it, while the label in the jar is a photocopy of a label with “Diplopodes de la Colombie Pièces anatomiques (J. Carl 1914)” written on it, indicating that the specimen(s) from which the parts came were syntypes (it is possible that there are parts from more than one syntype in the tube). The whereabouts of the rest of the syntypes is unknown.

Brachycerodesmus fuhrmanni (Carl, 1914), Fuhrmannodesmidae

fuhrmanni Carl, 1913b: 175, figs 1-2 [*Epinannolene*]. Illustration only.

Carl (1914b: 859-860, figs 65-68, 70-71) provided a description of ♂ and ♀ and gave the locality “La Camelia, 1800 m, Kaffeepflanzung bei Angelopolis.” The MHNG collection contains four specimens in alcohol in two vials. The first vial (MHNG-ARTO-18467) contains two large specimens, one of them broken. The second vial (MHNG-ARTO-18468) contains two smaller specimens, one of them with a pin running the length of the body, a smaller vial with dissected parts and a label with “Epinannolene fuhrmanni Carl ♀♂ (Schaltstadium)!” written on it. There are two further vials (MHNG-ARTO-18469 and MHNG-ARTO-18470) containing gonopods. The identification labels in the jar have “Colombie” and “Colombie Coll.

Fuhrmann" written on them respectively, indicating that the specimens are syntypes. There are two ♀ syntypes (referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00213a).

Epinannolene fuhrmanni Carl, 1913, Pseudonannolenidae

fuhrmanni Carl, 1914b: 875-876, figs 98-100 [*Microspirobolus*].

La Camelia, Kaffeepflanzung bei Angelopolis, 1800 m; Argelia, Kaffeepflanzung 1600 m. Unspecified number of ♂ and juveniles.

The MHNG collection contains a number of dissected parts, including gonopods, in alcohol (MHNG-ARTO-14420). A label in the tube containing them reads "Microspirob. fuhrmanni Carl ♂" and a photocopy of a label with "Diplopodes de la Colombie Pièces anatomiques (J. Carl 1914)" written on it, indicating that they belonged to one or more syntype(s). There is one syntype (referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00219a). The whereabouts of the other syntypes is unknown.

Spirobolellus fuhrmanni (Carl, 1914), Spirobolellidae

fuhrmanni Carl, 1914b: 962-963, fig. 258 [*Oniscodesmus*].

Bocca del Monte, Tambo, ca. 2000 m. One ♂ and one ♀. The MHNG collection contains parts of two specimens in two vials in alcohol. The first vial (MHNG-ARTO-18624) contains a single gonopod. The second vial (MHNG-ARTO-18625) contains a specimen with a pin running the length of the body. There is a data label in the jar with "Tambo, Bocca del Monte" written on it and one of the identification labels has "♀ Colombie Coll. Fuhrmann" written on it, indicating that the specimens are syntypes. The whereabouts of the rest of the ♂ syntype is unknown.

Oniscodesmus fuhrmanni Carl, 1914, Oniscodesmidae

fuhrmanni Carl, 1914b: 826-827, figs 1-8 [*Siphonophora*].

La Camelia bei Angelopolis (Central-Cordilleren, 1820 m). Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol (MHNG-ARTO-14530). The identification labels in the jar have "Camelia Colombie Coll. Fuhrmann" and "Colombie Coll. Fuhrmann" written on them respectively and there is a printed "Cotype" label, indicating that the specimens are syntypes.

Siphonophora fuhrmanni Carl, 1914

fuhrmanni Carl, 1914a: figs 7-8 [*Stemmatoius*].

Unspecified provenance and series (illustration only).

Carl (1914b: 853-855, figs 25, 30, 33-34, 62-64) provided a description of ♂ and ♀ and gave the locality as "Tambo, am Westhang der Sabana von Bogota, ca. 2000 m; Bogota, 2600 m." The MHNG collection contains two specimens,

each with a pin running the length of the body, in a vial in alcohol (MHNG-ARTO-14485). There are three other vials with dissected parts which may belong to these specimens or to others. The first (MHNG-ARTO-14486) contains legs and gonopods and a "♂" label. The second (MHNG-ARTO-14487) contains legs and gonopods. The third (MHNG-ARTO-14488) contains legs and a "♀" label. The identification labels in the jar have "Colombie coll. Fuhrmann" written on them, indicating that the specimens are syntypes.

Stemmiulus fuhrmanni (Carl, 1914), Stemmiulidae

fulvescens Carl, 1918: 433-435, figs 11-12 [*Rhinocricus*]. Moluques. Muséum de Genève. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol in two jars. One jar (MHNG-ARTO-18458) contains two broken specimens and a vial containing gonopods. The identification labels in the jar have "Moluques" and "Moluques (Deyrolle) types!" written on them respectively, indicating that the specimens are syntypes. The other jar (MHNG-ARTO-18459) contains one specimen and a vial containing gonopods. The identification labels in the jar have "Moluques (Deyrolle)" and "Moluques (Deyrolle) types!" written on them respectively, indicating that the specimen is a syntype.

Proporobolus fulvescens fulvescens (Carl, 1918), Rhinocricidae

fulvescens ascobinatus Carl, 1918: 435 [*Rhinocricus*].

Moluques. Muséum de Genève. One ♂ and one ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18454). Both of the specimens are broken and they are accompanied by a vial containing gonopods. The identification labels in the jar have "Moluques (Deyrolle)" and "Moluques" written on them respectively. Carl's original label also has "n. subsp." written on it, indicating that the specimens are syntypes.

Proporobolus fulvescens ascobinatus (Carl, 1918), Rhinocricidae

fulvotaeniatus Carl, 1912c: 181-183, text figs 19-21 [*Rhinocricus*].

Manipi, S.-Celebes, bei 800 m üB M. (coll. Sarasin). Two ♂ and two ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14313). The identification labels have "Manipi Celebes mérid., ex coll. Sarasin" and "type Manipi Celebes mérid., ex coll. Sarasin" written on them respectively, indicating that the specimen is a syntype. The other three syntypes (referred to as "Typen" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00158a).

Salpidobolus fulvotaeniatus (Carl, 1912), Rhinocricidae

gorontalensis Carl, 1912c: 188-189, text fig. 24 [*Rhinocricus*].

Gorontalo, N.-Celebes (coll. Sarasin). One ♂ and one ♀. The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14315). The specimen is broken and a pin protrudes from one of the halves. The identification labels have "Gorontalo Celebes sept. ex coll. Sarasin" and "type Gorontalo Celebes sept. ex coll. Sarasin" written on them respectively, indicating that the specimen is a syntype. There are two specimens identified as syntypes (one ♂ and one ♀ referred to as "Typen" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00161a), implying that the number of specimens mentioned in the original description was incorrect.

Salpidobolus gorontalensis (Carl, 1912), Rhinocricidae

gracilicornis Carl, 1914b: 828-830, figs 15-23 [*Siphonophora*].

Buenavista, Kefeetal bis Viota (Ost-Cordillere). Two ♂. The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14532). The identification labels in the jar have "Colombie Coll. Fuhrmann" and "Buenavista Colombie Coll. Fuhrmann" written on them respectively and there is a printed "Cotype" label, indicating that the specimen is a syntype. *Siphonophora gracilicornis* is the type species of the genus *Columbianum* Verhoeff, 1941a by monotypy (Jeekel, 1971).

Columbianum gracilicorne (Carl, 1914), Siphonophoridae

gracilipes Carl, 1902: 577-579, pl. 10, figs 13-16 [*Tectoporus*].

Java, Dr. L. Zehntner (Genfer Museum). One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14415). The identification labels in the jar have "Java, Zehntner" written on them, indicating that the specimen is the holotype. The gonopods are mounted on a microscope slide preparation (MHNG-ARTO14416) which is in a case glued to the lid of the jar. *Tectoporus gracilipes* is the type species of the genus *Tectoporus* Carl, 1902 by monotypy (Jeekel, 1971).

Tectoporus gracilipes Carl, 1902, Paradoxosomatidae

gracilis Carl, 1913a: 219-221, fig. 13 [*Peridontopyge* (*Neodontopyge*)].

Freetown, Sierra-Leone. One ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18476). The specimen has a pin running the length of the body and there are dissected parts including gonopods in a separate vial. The identification label has "Sierra Leone W. Volz" written on it, indicating that the specimen is a syntype. The other syntype is presumably in the NMBE. *Peridontopyge gracilis* is the type species of the genus *Neodontopyge* Carl, 1913 by monotypy (Jeekel, 1971).

Neodontopyge gracilis Carl, 1913, Odontopygidae

gracilis Carl, 1926: 382-384, figs 9-14 [*Pixodesmus*].

Hienghène, Juni 1911. Unspecified number of ♂ (♀ not explicitly mentioned).

No specimens found in the MHNG. There is one ♂ syntype (referred to as "Typus" in the NMB catalogue) in the NMB (inventoty number NMB-DIPL-00343a). *Pixodesmus gracilis* is the type species of the genus *Pixodesmus* Carl, 1926 by monotypy (Jeekel, 1971).

Pixodesmus gracilis Carl, 1912, Pyrgodesmidae

gracilis Carl, 1914b: 927-928, figs 184-187 [*Trichomorpha*].

La Camelia bei Angelopolis. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Trichomorpha gracilis Carl, 1914, Chelodesmidae

gracillimus Carl, 1941b: 653-656, figs 121-126 [*Picrogonopus*].

Nilgiris: Kleiner Djungel bei Coonoor, 1600 m. One ♂ and two ♀.

The MHNG collection contains three specimens in alcohol in two vials. The first vial (MHNG-ARTO-14234) contains one specimen broken into several pieces and an identification label with "♂ type Coonoor" written on it. The second vial (MHNG-ARTO-14235) contains two specimens broken into several pieces and an identification label with "Coonoor" written on it. The ♂ was not designated as holotype in the original description and so all of the specimens are syntypes. *Picrogonopus gracillimus* is the type species of the genus *Picrogonopus* Carl, 1941 by monotypy (Jeekel, 1971).

Picrogonopus gracillimus Carl, 1941, Harpagophoridae

grandis Carl, 1922: 566-568, figs A-D [*Siphonophora*].

Gap (Distrikt Selangor), Malakka, 2700' ü. M. One ♂.

The MHNG collection contains a slide preparation of the gonopods of the holotype (MHNG-ARTO-14533). The rest of the specimen is in the ZMHB (Moritz & Fischer, 1978b).

Pterozonium grandis (Carl, 1922), Siphonophoridae

gravelyi Carl, 1932: 518-521, figs 170-177 [*Klimakodesmus*].

Nilgiris: Kaffee-Pflanzung unterhalb Coonoor, ca. 1600 m, unter Stein mit Ameisen, 27.XII ♂ Typus; Karteri-Tälchen, bei Coonoor, ca. 1500 m, unter Holz, 29.XII; Coonoor, gegen Lady Cunnings-Seat, ca. 1800 m, unter Laub, am Wege; Mudumalai, Moyar-Becken, ca. 1000 m, an Bachufer, unter Stein, 5.II. Unspecified number of ♂ and juveniles.

The MHNG collection contains six specimens in alcohol in two jars. The first jar (MHNG-ARTO-18609) contains one broken specimen. The data label has "Nilgaris, Coonoor, plant. de café 27.XII.26" written on it, indicating that this is the holotype. The second jar contains three vials. The first vial (MHNG-ARTO-18610)

contains three specimens, two of them in fragments. The data label has “Mudumalai 5.II.27 ♂ juvs.” written on it. The second vial (MHNG-ARTO-18611) contains one broken specimen. The data label has “Nilgaris, Karteri 2.I.27” written on it. The third vial (MHNG-ARTO-18612) contains one broken specimen. The data label has “Nilgaris, Coonoor, 1800 m L.C. Seat” written on it. The identification label in the tube has “Cotype” written on it, and the specimens in the second jar can be considered paratypes. *Klimakodesmus gravelyi* is the type species of the genus *Klimakodesmus* Carl, 1932 by monotypy (Jeekel, 1971).

Klimakodesmus gravelyi Carl, 1932, Pyrgodesmidae

gravelyifergusoni Carl, 1941b: 619, fig. 74 [*Aulacobolus*]. Trivandrum, im südlichen Travancore. H. Ferguson leg., British Museum. One ♂ and two ♀.

No specimens found in the MHNG collection. The syntypes are in the BMNH.

A junior synonym of *Aulacobolus gravelyi* Silvestri, 1916, Pachybolidae

gravelyi septrionalis Carl, 1941b: 619-620, fig. 75 [*Aulacobolus*].

Anaimalais: Attakatti und Umgebung, 1000-1200 m. Unspecified number of ♂ and ♀.

The MHNG collection contains 16 specimens in alcohol (MHNG-ARTO-14432). The specimens are accompanied by four small vials, two containing gonopods and two containing partially dissected heads and anterior segments. The pencil-written data labels have “Attakatti beim Bungalow, unter Borke 1.III.27” and “Nebenfluss des Aligar, 2 Meilen ob Attikatti 24.II, Unter faulen Stämmen” written on them, indicating that the specimens are syntypes.

A junior synonym of *Aulacobolus gravelyi* Silvestri, 1916, Pachybolidae

greeni Carl, 1941b: 602-603, figs 52-56 [*Diopsiulus (Plusiochaeturus)*].

Ceylon: Pundloya, 1000 m. British Museum (Green leg.). One ♂ and one ♀.

No specimens found in the MHNG collection. The syntypes are in the BMNH.

Stemmiulus greeni Carl, 1941, Stemmiulidae

haenschi Carl, 1918: 419-420, fig. 1 [*Pycnotropis*].

Santa Inez, Ecuador. R. Heansch leg. Musée de Berlin. One ♂.

No specimens found in the MHNG. The holotype is in the ZMHB (Moritz & Fischer, 1978a).

Pycnotropis haenschi Carl, 1918, Aphelidesmidae

hassleri Carl, 1917: 406-409, figs 25-26 [*Stenostreptus*].

San Bernadino, Paraguay (Dr. Hassler leg.), Asuncion, Paraguay (Dr. E. Joulowsky leg.). More than one ♂.

The MHNG collection contains one specimen in

alcohol under the name *Stenostreptus hassleri* (MHNG-ARTO-14253). The specimen is in three large pieces, with the gonopods separate. The identification label has “type Paraguay” written on it, indicating that the specimen was part of the type series. Hoffman (1974: 80) designated this specimen as the lectotype. There are a further seven specimens under the name *Urostreptus hassleri* in two jars (MHNG-ARTO-14254 and MHNG-ARTO-14255), which are probably paralectotypes. *Stenostreptus hassleri* is the type species of the genus *Stenostreptus* Carl, 1917 by monotypy (Jeekel, 1971).

Urostreptus hassleri (Carl, 1917), Spirostreptidae

helicogonus Carl, 1941b: 679-682, figs 173-178 [*Thyropygus*].

Nilgiris: Coonoor, 1600 m, Djungel, unter Laub, auf Humus, 24.XII.1926. One ♂ and one ♀.

The MHNG collection contains two specimens in alcohol in one vial (MHNG-ARTO-14256). Both specimens are broken, and are accompanied by a smaller vial containing a head, gonopods and other fragments. The data label has “Kleiner Djungel 24.XII, unterhalb Coonoor” written on it, indicating that the specimens are syntypes.

Gnomognathus helicogonus (Carl, 1941), Harpagophoridae

hendersoni Carl, 1932: 449-451, figs 40-43 [*Xiphidiogonus*].

Palnis: Kodaikanal, ca. 2200 m, J. R. Henderson leg. 24.X.94 [Brit. Museum 170-171 (A)]. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol, accompanied by a small vial containing gonopods and other legs (MHNG-ARTP-14257). The data label has “Palnis, Kodaikanal, Henderson leg.” written on it. The identification label has “Xiphidiogonus hendersoni Carl, ♂♀ cotypes, ♂ type gonop., pattes 1^{re} et 2^{me}” written on it. Carl did not designate a holotype in the original description and so these specimens are syntypes. There are further syntypes in the BMNH.

Xiphidiogonus hendersoni Carl, 1932, Paradoxosomatidae

heterosculptus Carl, 1902: 635-638, pl. 12, figs 73-75 [*Pachyurus*].

Guatemala (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains one intact specimen and parts of at least two others in alcohol (MHNG-ARTO-18555). The specimens are accompanied by a vial containing gonopods. Both of the original identification labels in the jar have “Types ♂♀ Guatemala” written on them, indicating that the specimens are syntypes. An undated typewritten label states that Hoffman identified these specimens as *Amplinus heterosculptus*.

Polylepiscus heterosculptus (Carl, 1902), Platyrrhacidae

heterotuberculata Carl, 1902: 667-668, pl. 12, fig. 99 [*Poratia*].

Java, auf Zuckerrohr, hinter Blattscheiden, Dr. L. Zehntner (Genfer Museum). 16 ♀.

The MHNG collection contains ten specimens in alcohol in three vials. The first vial (MHNG-ARTO-14258) contains the lectotype designated by Adis *et al.* (2000: 152), the second (MHNG-ARTO-14259) contains one dissected specimen and the third (MHNG-ARTO-14260) contains the remaining specimens. The identification labels in the jar both have "Java [Dr. L.] Zehntner" written on them, indicating that the specimens were part of the type series. There is a microscope slide preparation of the vulva of the dissected paralectotype in a case glued to the lid of the jar (MHNG-ARTO-14259a).

A junior synonym of *Poratia digitata* (Porat, 1889), Pyrgodesmidae

hingstoni Carl, 1935: 326-329, figs 1-6 [*Orthomorpha* (*Orthomorpha*)].

Yatung, 10,000', 16.IV.1924. One ♂ and two ♀.

The MHNG contains one specimen and some dissected parts of a second specimen in alcohol (MHNG-ARTO-18557). The intact specimen has a pin running the length of the body and is in a small vial. The gonopods of another specimen are in a second small vial, and both of these are in a larger tube which also contains a label with "Orthomorpha (O.) hingstoni Carl, 1♀ + gonopode ♂, Yatung 10000' Everest Exp. 1924" written on it. The original identification labels in the jar have "♀ and gon. ♂ Yatung Himalaya 10000' Everest Exped. 1924" and "Yatung Himalaya 3000 m" written on them respectively, and the specimens are syntypes. There are further type specimens in the BMNH. *Orthomorpha hingstoni* was designated as the type species of the genus *Orophosoma* Jeekel, 1980 in the original description (Jeekel, 1980c). *Delarthrum hingstoni* (Carl, 1935), Paradoxosomatidae

hirsuta Carl, 1914b: 921, fig. 168 [*Trichomorpha*].

Aguacatal. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Trichomorpha hirsuta Carl, 1914, Chelodesmidae

hirsutus Carl, 1914b: 965 [*Trigonostylus*].

Camelia, Kaffeepflanzung, 1800 m. One ♀.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Cyrtodesmus hirsutus (Carl, 1914), Cyrtodesmidae

hirta Carl, 1932: 439-440, figs 24-26 [*Sundanina*].

Travancore: Grosser Wald im oberen Vattavadai-Tal, zwischen den Palnis und Anaimalais, ca. 1850 m, 10.IV. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14261). The specimen is placed in a small vial and accompanied by a second vial containing

the gonopods and other fragments. The specimen had a pin running the length of the body, but is now in several pieces (the largest is still on the pin). The locality label has "Travancore, Vattavadai" written on it and the identification label has "Type" written on it, indicating that the specimen is the holotype. A pencil note in the jar states that the specimen was studied by Jeekel in 1976.

Antichirogonus hirtus (Carl, 1932), Paradoxosomatidae

hirtipes Carl, 1912c: 132-133, pl. 5, figs 6-7 [*Strongylosoma*].

Loka, Süd-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14305). The specimen has a pin running the length of the body. The identification labels have "Loka Celebes mérid. coll. Sarasin" and "type Celebes mérid. coll. Sarasin" written on them respectively, indicating that the specimen is a syntype. There are three syntypes in the NMB under the name *Orthomorpha hirtipes* (inventory number NMB-DIPL-00127a).

Tectorporus hirtipes (Carl, 1912), Paradoxosomatidae

hispidus Carl, 1926: 456-457, figs 149-151 [*Rhinotus*].

Loyalty-Inseln: Ouvéa, Fayaoué, 15. Mai 1912. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains a microscope slide preparation of the anterior gonopods of a syntype (MHNG-ARTO-14345). There are two syntypes (one ♂ and one ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00385a).

Rhinotus hispidus Carl, 1926, Siphonotidae

hortensis Carl, 1914a: figs 2, 3 [*Stemmatoiulus*].

Illustration only.

Carl (1914b: 845-848, figs 31, 35-44) provided a description of ♂ and ♀, and gave the localities "La Camelia, Kaffeepflanzung bei Angelopolis, 1800 m; Puerto de los Pobres, am Cauca; Jirardot am Magdalena, 250 m." The MHNG collection contains one specimen and two vials with dissected parts in alcohol. The first vial (MHNG-ARTO-14489) contains one specimen. The second vial (MHNG-ARTO-14490) contains legs and gonopods and a "♂" label. The third vial (MHNG-ARTO-14491) contains legs, antennae and mouthparts and a "♀" label. The identification labels in the jar have "Colombie" and "Colombie Coll. Fuhrmann" written on them respectively and there is a printed "Cotype" label, indicating that the specimens are syntypes. There are two more ♀ syntypes in the NMB (inventory number NMB-DIPL-00209a).

Stemmiulus hortensis (Carl, 1914), Stemmiulidae

humberti Carl, 1902: 590-593 [*Prionopeltis*].

Paradenia (Ceylon), Dr. P. und F. Sarasin (Basler Museum). Two ♂.

No specimens found in the MHNG. The two ♂ syntypes

are in the NMB (inventory number NMB-DIPL-00467a). *Anoplodesmus humberti* (Carl, 1902), Paradoxosomatidae

humberti Carl, 1911: 399-401, figs 3-5 [*Trachyiulus*].

Ceylon, Humbert. Unspecified number of ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14262). The specimens are in a glass vial, one of them apparently intact, the other in fragments. A smaller vial holds a pair of gonopods. The identification label in pencil has "Ceylan, Voy. Humbert" written on it. The identification label in ink is almost illegible. There is a printed "Type" label, indicating that the specimens are syntypes. These specimens were part of the material identified as *T. ceylanicus* (Peters, 1864) by Humbert (1865), but recognised as a distinct species by Carl when he revised the specimens.

Trachyjulus humberti Carl, 1911, Cambalopsidae

humberti willeyi Carl, 1941b: 641-642, figs 107-109 [*Trachyiulus*].

Ceylon: Karawehgawem. P. A. Willey leg. (British Museum). One ♂.

The MHNG collection contains two microscope slide preparations: 1) a slide (MHNG-ARTO-18463) with gonopods with labels with "Trachyiulus humberti Carl ssp. willeyi Carl" and "Gonop. I et II" handwritten on them respectively; 2) a slide (MHNG-ARTO-18464) with legs with labels with "Trachyiulus humberti Carl ssp. willeyi Carl" and "♂ type Bp. 1 et 2" handwritten on them respectively. Both belong to the holotype. The rest of the holotype is in the BMNH. The MHNG alcohol collection contains some specimens collected after the date of the publication of the original description and these are therefore not part of the type series.

Trachyjulus willeyi willeyi Carl, 1941, Cambalopsidae

humboldti Carl, 1926: 393-394, figs 35-38 [*Canacophilus* (*Canacophilus*)].

Neu-Caledonien: Gipfel des Mt. Humboldt 1600 m, 18. Sept. 1911; Mt. Canala, 4. Nov. 1911, Wald, 800-1000 m. Two ♂.

No specimens found in the MHNG. The two ♂ syntypes (referred to as "Typus" in the NMB catalogue) are in the NMB (inventory numbers NMB-DDIPL-00348a and NMB-DIPL-00348b).

Canacophilus humboldti Carl, 1926, Dalodesmidae

humilis Carl, 1932: 469-471, figs 68-74 [*Ootacadesmus*]. Niligiris: Dodabetta Reserved Forest, 2500 m, 11.I. unter faulem Holz. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18593). The specimen, which is broken, and a label with "♂ type!" written on it and a second small vial containing gonopods and a label with "Gon., 3° patte ♂" written on it are placed in a larger vial with an identification label. Although there is no locality data it is clear that this specimen is the holotype. *Ootacadesmus*

humilis was designated as the type species of the genus *Ootacadesmus* Carl, 1932 in the original description.

Ootacadesmus humilis Carl, 1932, Fuhrmannodesmidae

hystrix Carl, 1926: 402-403, fig. 53 [*Cotylotropis*].

Koné, Aug. 1911; Ngoï-Tal, 200 m, 14. Sept. 1911. Two ♀.

No specimens found in the MHNG. The two ♀ syntypes (referred to as "Typus" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00354a and NMB-DIPL-00354b). *Cotylotropis hystrix* is the type species of the genus *Cotylotropis* Carl, 1926 by monotypy (Jeekel, 1971).

Cotylotropis hystrix Carl, 1926, *incertae sedis*

imitans Carl, 1914b: 953-954, figs 235-239 [*Gyrophallus*].

La Camelia, Kaffeepflanzung. One ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18590). The specimen is broken into three parts, and is accompanied by a small vial containing fragments of dissected parts. Both of the identification labels in the jar have "♂ Colombie coll. Fuhrmann" written on them, indicating that the specimen is a syntype. The whereabouts of the other syntype is unknown. *G. imitans* was designated as the type species of the genus *Gyrophallus* Carl, 1914 by Brölemann (1916).

Gyrophallus imitans Carl, 1914, Fuhrmannodesmidae

implicatum Carl, 1941a: 371-374, figs 23-25 [*Polydrepanum*].

Kanda, bei Bombay. Wroughton leg. British Museum. One ♂.

No specimens found in the MHNG collection. The holotype is in the BMNH.

Telodrepanum implicatum (Carl, 1941), Paradoxosomatidae

incommodus Carl, 1912a: 274-275 [*Trigoniulus*].

Elat auf Gross-Kei. Two ♀.

No specimens found in the MHNG collection. The SMF collection contains three specimens in alcohol, two of them ♀. One ♀ has a pin running most of the length of the body (SMF 1356, designated here as lectotype), the other ♀ also has a pin running most of the length of the body (SMF 1366). The identification labels in the jars have "Groß Key: Elat H. Merton S. 1908" written on them indicating that they are type specimens. This species can not be securely placed in a genus and is in need of a revision according to Jeekel (2001: 83).

?*Trigoniulus incommodus* Carl, 1912, Pachybolidae

inconstans Carl, 1914b: 869-871, figs 88-91 [*Spirostreptus* (*Nanostreptus*)].

La Camelia, Kaffeepflanzung bei Angelopolis 1800 m. Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol

(MHNG-ARTO-18477). Two of the specimens have a pin running all or part of the length of the body, and they are accompanied by a vial containing gonopods. The identification labels in the jar have "Camelia (Colombie) 1800 m. Coll. Fuhrm." and "Camelia (Colombie) Coll. Fuhrmann" written on them respectively, indicating that the specimens are syntypes. There are two syntypes (one ♂ and one ♀ referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00216a).

Hyloecostreptus inconstans (Carl, 1914), Spirostreptidae

indus Carl, 1942: 148, figs 8, 11-12, 17-18 [*Glomeridesmus*].

Inde méridionale, 1926/27, Carl leg. Unspecified number of ♂ and ♀.

The MHNG collection contains six microscope slide preparations; 1) a slide (MHNG-ARTO-18632) with a head and first two body rings with a label with "Glomeridesmus indus n. sp., Mariyanshola" written on it; 2) a slide (MHNG-ARTO-18633) with mouthparts with a label with "Glomeridesmus indus n. sp., ♂ Mariyanshola" written on it; 3) a slide (MHNG-ARTO-18634) with head and mouthparts and a label with "Glomeridesmus indus" written on it; 4) a slide (MHNG-ARTO-18635) with legs with a label with "Glomeridesmus indus n. sp." written on it; 5) a slide (MHNG-ARTO-18636) with legs with a label with "Glomeridesmus indus n. sp. ♂ juv." written on it; 6) a slide (MHNG-ARTO-18637) with telopods with a label with "Glomeridesmidae ♂ Mariyanshola dessin publié!" written on it. These are all parts of syntypes. There are two other slides without any identification label (MHNG-ARTO-18638 and MHNG-ARTO-18639) which may also belong to the type series. The other parts of the specimens appear to have been lost.

Glomeridesmus indus Carl, 1942, Glomeridesmidae

insolitus Carl, 1941b: 598-602, figs 47-51 [*Diopsiulus* (*Plusiochaeturus*)].

Onere Palnis: Kleine Shola bei Pumbarai, 1900 m. One ♂.

The MHNG collection contains one specimen. The main part of the body is in alcohol in a small vial placed in a larger one (MHNG-ARTO-14453). The labels in the large vial have "Diopsiulus insolitus Carl ♂ type Pumbarai 29.III" and "Kleine Shola oberh Pumbarai 29.III 1♂" written on them. A label in the jar has "Diopsiulus insolitus Carl ♂ type, Palnis sup. Gonop. et 2e patte ♂, voir préparation" written on it, indicating that the specimen is the holotype. There is also a microscope slide preparation (MHNG-ARTO-14454) with the gonopods and legs 1, 2, 3 and 8 of the holotype.

Stemmiulus insolitus (Carl, 1941), Stemmiulidae

instabilis Carl, 1914b: 879-881, figs 107-108 [*Rhinocricus*].

Argelia, Kaffeepflanzung, bei Viota 1600 m; Honda-Gauduas. One ♂ and one ♀.

No specimens found in the MHNG collection. The whereabouts of the syntypes is unknown.

Rhinocricus instabilis instabilis Carl, 1914, Rhinocricidae

instabilis adolescens Carl, 1914b: 881 [*Rhinocricus*].

Tambo, 2000 m (Coll. Fuhrmann); Bogota (Berliner Museum). Unspecified number of ♂ and ♀.

No specimens found in the MHNG collection. The ZMHB collection contains two ♀ syntypes (Moritz & Fischer, 1975).

Rhinocricus instabilis adolescens Carl, 1914, Rhinocricidae

instabilis valens Carl, 1914b: 881-882 [*Rhinocricus*].

Zwischen Fresno und Mariquita, 400 m (Coll. Fuhrmann); Sta. Inez, in Ecuador leg. Haensch (Berliner Museum). Unspecified number of ♂ and one ♀.

The MHNG collection contains two specimens in alcohol in separate jars. One jar (MHNG-ARTO-14451) contains a specimen with a pin running along the anterior of the body, the specimen is slightly split, exposing the gonopods. The identification labels in the jar have "♂ Sta Inez, Ecuador" written on them, and the specimen is probably a syntype. The other jar (MHNG-ARTO-14452) contains a smaller specimen. The data label reads "Colombie acheté à M. Bonnal XII.1901" and the specimen is probably not a syntype. The ZMHB contains three ♂ syntypes (Moritz & Fischer, 1975).

Rhinocricus instabilis vallens Carl, 1914, Rhinocricidae

insularis Carl, 1918: 453-456, figs 33-36 [*Stenobolus*].

Male-Atoll, Maledives. Muséum de Genève. One ♂, an unspecified number of ♀ and one juvenile ♂.

The MHNG collection contains four specimens in alcohol in three vials. The first vial (MHNG-ARTO-14263) contains one specimen with a pin running the length of the body and a small vial containing gonopods and other fragments. This specimen, the only ♂, is here designated lectotype. The second vial (MHNG-ARTO-14264) contains one specimen with a pin running the length of the body. The third vial (MHNG-ARTO-14265) contains two specimens, each with a pin running the length of the body. The locality label has "Male Atoll, Maledives" written on it in pencil, and the identification labels have "Maldives" and "Maldives types" written on them respectively, indicating that the specimens are types. *Stenobolus insularis* is the type species of the genus *Stenobolus* Carl, 1918 by monotypy (Jeekel, 1971).

Stenobolus insularis Carl, 1918, Pachybolidae

interfectus Carl, 1941b: 690-692, figs 195-198 [*Thyropygus*].

Anaimalais: Attakatti, 1000 m, sehr trockener Busch. One incomplete ♂.

The MHNG collection contains parts of one specimen in alcohol (MHNG-ARTO-14266). The specimen is in five pieces in a small vial separated by a cotton wool

plug from the detached gonopods. The identification label in the larger vial containing the smaller one with the specimen has “Attakatti, II.1927” written on it, and the identification labels in the jar have “type Anaimalais” and “type Anaimalais Voy. Carl” written on them respectively, indicating that the specimen is the holotype. *Gnomognathus interfectus* (Carl, 1941), Harpagophoridae

intermedia Carl, 1909b: 335-336, pl. 8, figs 47-48, 66 [*Odontopyge*].

Njarugenje-Niansa (Central-Ruanda), auf Grasland; Kirehe in Kissaka (Süd-Ost-Ruanda). Unspecified series. The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-18495). Three specimens are reinforced with pins, and there is a vial containing gonopods. The identification labels in the jar have “Njarugenje-Niansa (Central-Ruanda) J. Carl” and “types, Ruanda central J. Carl” written on them respectively, indicating that the specimens are syntypes. There is a ♀ syntype in the ZMUH (Weidner, 1960).

Geotypodon intermedius (Carl, 1909), Odontopygidae

intermedium Carl, 1902: 564-566, pl. 10, figs 8-10 [*Strongylosoma*].

Rio Grande do Sul (Basler Museum). Three ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14321). The identification labels both have “Rio Grande do Sul, Dr Ternetz” written on them and the specimen is almost certainly a syntype given the provenance and the relationship between Ternetz and the NMB (see *Trichogonostreptus ternetzi* Carl, 1918). There is also a microscope slide preparation of the gonopods of a syntype (MHNG-ART-14536). The other two syntypes (one ♂ and one ♀) are in the NMB (inventory number NMB-DIPL-00233a) under the name *Catharosoma glabrum* (Peters).

Catharosoma intermedium (Carl, 1902), Paradoxosomatidae

intermedius Carl, 1914b: 899-900, figs 127-129 [*Alocodesmus*].

Guadua, Magdalena, Buenavista. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14352). Each specimen has a pin running the length of the body. The specimens are in separate vials and there is fifth vial containing gonopods. The identification labels have “Magdalena (Colombie)” and “Colombie, coll. Fuhrmann” written on them respectively and there is a label with “Cotype” printed on it, indicating that the specimens are syntypes. There is a further ♂ syntype (referred to as “Co-Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00224a).

Alocodesmus intermedius Carl, 1914, Chelodesmidae

iuliforme Carl, 1905: 262-264, figs 2-2a [*Strongylosoma*]. Cabo St Juan. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14539). One of the specimens has a pin running the length of the body. The identification labels in the jar have “Guinée espagnole” written on them, indicating that the specimens are syntypes. According to Andrés Cobeta (2001: 68) there are four syntypes in the MNCN (MNCN 20.07/1177).

Scolodesmus iuliformis iuliformis (Carl, 1905), Paradoxosomatidae

iuliforme volzi Carl, 1913a: 202-204, fig. 1 [*Strongylosoma*].

Yonni und Falaba (nordöstliches Sierra-Leone). Unspecified number of ♂ and ♀.

The MHNG collection contains seven specimens in alcohol (MHNG-ARTO-14540). There is a separate vial containing gonopods (MHNG-ARTO-14541). The original identification labels in the jar have “Sierra Leone W. Volz” written on them, indicating that the specimens are syntypes. There is also an undated typewritten label indicating that Hoffman identified the specimens as *Scolodesmus iuliformis* (Carl). There may be other syntypes in the NMBE.

Scolodesmus volzi volzi (Carl, 1913), Paradoxosomatidae

japonicus Carl, 1902: 614-616, pl. 11, figs 38-39 [*Polydesmus*].

Japan (Genfer Museum). Two ♂.

The MHNG collection contains parts of at least six broken specimens (MHNG-ARTO-14542). There is a discrepancy between the original description, which mentions ♀ characters, and the list of specimens (two ♂) which follow it. The type series is restricted to the two ♂ which are presumably amongst these specimens. The original identification labels have “Japon ♂♀” written on them and there is a separate pencil label reading “Japon”. There is also an undated typewritten label indicating that Hoffman identified the specimens as *Epanerchodus japonicus* (Carl). *Polydesmus japonicus* Carl, 1902 is a junior homonym of *P. japonicum* Peters, 1864. The replacement name *Polydesmus carli* is proposed here for *P. japonicus* Carl, 1902.

Polydesmus carli **nom. nov.**, Polydesmidae

javanicus Carl, 1911: 401-404, figs 6-9 [*Glyphiulus*].

Java, Passaroean, zwischen den Wurzeln von Zuckerrohr. Dr. L. Zehntner leg. One ♂ and an unspecified number of ♀.

The MHNG collection contains eight specimens in alcohol (MHNG-ARTO-14267). The identification label in pencil has “Java, Dr. L. Zehntner” written on it but the other identification label is illegible, and there is a label with “type” printed on it, indicating that the specimens are syntypes.

Glyphiulus javanicus Carl, 1911, Cambalopsidae

junodi Carl, 1917: 384-387, figs 3-4 [*Poratophilus*].

Shilowana et Rikalla, Afrique méridionale orientale (Junod leg.). Two ♂.

The MHNG collection contains two specimens in alcohol in two jars. The first jar (MHNG-ARTO-14268) contains one specimen and a vial containing gonopods and other fragments. The identification label has "type Shilowana, Afrique mérid." written on it, indicating that it is a syntype. The second jar (MHNG-ARTO-14269) contains one specimen and a vial containing gonopods and other fragments. The identification label has "Ricalla, Afrique mérid." written on it, indicating that the specimen is a syntype.

Zinophora junodi (Carl, 1917), Harpagophoridae

kandti Carl, 1909b: 323-325, pl. 6, fig. 19 [*Lophostreptus*].

Njarugenje-Niansa (Central-Ruanda); Kirehe in Kissaka (Süd-Ost-Ruanda); vom Kagera durch Süd-Karagwe bis Ost-Ussuwi; Entebbe (Uganda). Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol in two jars. One jar (MHNG-ARTP-18471) contains the lectotype designated by Demange & Mauriès (1975: 55), although it is unclear if the designation is valid because they also state that no lectotype was designated (Demange & Mauriès, 1975: 70). The identification labels in the jar have "Ruanda centrale J. Carl" and "Njaugenje-Nainsa, Ruanda Dr J. Carl" written on them respectively. The second jar contains two vials. One (MHNG-ARTO-18472) has a single specimen, a smaller vial containing dissected parts including gonopods and a handwritten label stating that the specimen had been studied by Elsa Krabbe. The other (MHNG-ARTO-18473) has seven specimens, four of them broken. The jar contains typewritten copies of the identification labels in the first jar. All of these specimens are part of type series. There is one ♀ paralectotype or syntype in the ZMUH (Weidner, 1960), three in the MCZL, two in the ZMHB (Moritz & Fischer, 1974) and one in the NMB (inventory number NMB-DIPL-00179a). *Lophostreptus kandti* was designated as the type species of *Bucinogonus* Demange & Mauriès, 1975 in the original description of the genus.

Bucinogonus kandti (Carl, 1909), Spirostrepsidae

kandti Carl, 1909b: 342-344, pl. 8, figs 59-60 [*Odontopyge*].

West-Ruanda, Dr. R. Kandt leg. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18496). One of the specimens is broken and placed in a vial. The identification labels in the jar have "Ruanda occid." and "types! Ruanda occid." written on them respectively, indicating that the specimens are syntypes.

Odontopyge kandti kandti Carl, 1909, Odontopygidae

kandyanus Carl, 1932: 497-499, figs 127-130 [*Archandrodesmus*].

Ceylon: Kandy (Willey leg. Brit. Museum). Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14372). The specimens, one of them broken, are in a vial and accompanied by a smaller vial containing gonopods. The data label has "Ceylan, Kandy" written on it, and the identification label has "♂♀ cotypes" written on it, indicating that the specimens are syntypes. No syntypes could be located in the BMNH.

Cryptocorypha kandyanus (Carl, 1932), Pyrgodesmidae

kelaarti valparaiensis Carl, 1932: 462-464, figs 60-61, 67 [*Anoplodesmus*].

Anaimalais: Valparai, Talboden, unter Holz. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14270). Both specimens have a pin running the length of the body and there is a small vial containing gonopods. The identification label has "types Valparai, Anaimalais, 1.III.27" written on it, indicating that the specimens are syntypes.

Chondromorpha kelaarti valparaiensis (Carl, 1932), Paradoxosomatidae

laeve Carl, 1912c: 110-113, text figs 1-3 [*Castanotherium*].
Matinangkette, Nord-Seite 250-1000 m über M., Nord-Celebes (coll. Sarasin). Two ♀.

No specimens found in the MHNG collection. The ♀ syntypes (referred to as "Typen" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00114a).
Castanotherium laeve Carl, 1912, Zephroniidae

laevisulcata Carl, 1932: 436-438, figs 19-23 [*Sundanina*].
Palni-Hills: Sholas bei Vandaravu und Mariyanshola, ca. 2300 m, 6.-12.IV.27; unter Holz. Unspecified number of ♂ and ♀.

The MHNG collection contains 11 specimens in alcohol in two jars. The first jar contains two vials. The first vial (MHNG-ARTO-14271) contains a specimen with a pin running the length of the body and a smaller vial holding the gonopods and other fragments. The data label has "Palnis, Vandavravu shola" written on it. Jeekel (1980a: 173) designated this specimen as the lectotype. The second vial (MHNG-ARTO-14272) contains five broken specimens, presumably with the same data as the lectotype and thus paralectotypes. The second jar (MHNG-ARTO-14273) contains five broken specimens, two with pins running the length of the body. The data label has "Palnis, Mariyanshola" written on it, indicating that the specimens are paralectotypes.

Antichirogonus laevisulcatus (Carl, 1932) Paradoxosomatidae

lateralis Carl, 1912c: 182-785, text fig. 22 [*Rhinocricus*].
S.-O.-Celebes und Boeton (Dr J. Elbert). One ♂ and two .

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18460). The identification labels in the jar have “♂ cotype Boëton S.E. de Célèbes ex coll. Elbert” and “♂ cot. Boëton (ex coll. Elbert)” written on them respectively. The SMF collection contains one ♂ with dissected gonopods and two ♀ in alcohol. The identification label has “Celebes: Roembi-Mengkoke, Boeton, Elbert 1909” written on it, indicating that the specimens are part of the type series. After examination of the types the ♂ in the SMF (SMF 1847) was placed in a separate jar and is here designated lectotype. It is not clear if the specimen in the MHNG is part of the type series, or if the number of specimens given in the original description is incorrect.

Salpidobolus lateralis (Carl, 1912), Rhinocricidae

lateralis atratus Carl, 1912c: 185 [*Rhinocricus*].

Roembi-Megkoka, S.-O.-Celebes (Dr J. Elbert). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTP-18461). The identification labels in the jar have “cotype ex coll. Elbert, Roembi-Megkoka (Celebes merid.)” and “S.E. de Celebes (cotype ex coll. Elbert)” written on them respectively, indicating that the specimen is a syntype. The SMF collection contains one ♂ and one ♀ in alcohol (SMF 1848) under the name *Rhinocricus lateralis atractus* [sic]. The identification label has “SO-Celebes: Roembi-Mengkoke, Elbert, 1909” written on it, indicating that the specimens are syntypes.

A junior synonym of *Salpidobolus lateralis* (Carl, 1912), Rhinocricidae

laticollis Carl, 1909b: 346-347, pl. 7, fig. 39, pl. 8, figs 63-64 [*Odontopyge*].

Biaramuli (Ost-Ussuwi). Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol in two vials. The first vial (MHNG-ARTO-18497) contains one broken specimen and, separated by a cotton wool plug, dissected parts including gonopods. A label in the vial states that the specimen was selected as lectotype by O. Krauss. The second vial (MHNG-ARTO-18498) contains four specimens, all broken, and a label stating that they were designated as paralectotypes by O. Krauss. The identification labels in the jar have “Biaramuli J. Carl” and “types Ost-Ussuwi Dr J. Carl” written on them respectively, indicating that the specimens are part of the type series. Krauss (1960: 179) states that he examined the ♂ lectotype and ♀ paralectotypes which is probably a valid lectotype designation.

Spinotarsus laticollis (Carl, 1909), Odontopygidae

leucopygus Carl, 1912a: 278-279, fig. 18 [*Rhinocricus*].

Aru-Archipel: Dobo, Wammer. Kei-Archipel: Elat, Gross-Kei. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol

(MHNG-ARTO-14320) under the name *Dinematocricus leucopygus* (Carl). The identification labels have “type Ile Wammer (Aroe) ex coll. Merton” written on them, indicating that the specimens are syntypes. There is a ♀ syntype (referred to as “Typ” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00202a) and eleven syntypes in the SMF (SMF 1849, Aru Islands, Wämmer-Insel; SMF 1850, Elat: Gross-Kei).

Dinematocricus leucopygus (Carl, 1912), Rhinocricidae

leucopygus Carl, 1926: 421-423, figs 76-79 [*Spirobolellus*].

Neu-Caledonien: Ngoï-Tal, 200 m, 16. Sept. 1911; Mt. Yaté, ca. 500 m, 27. März 1912; Prony, 100 m, 1. April 1912. Unspecified number of ♂ and ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14326), two with pins running most or part of the length of the body. The identification label has “Mt Yaté, Nlle. Caledonie” written on it, indicating that the specimens are syntypes. There are six syntypes (three ♂ and three ♀ referred to as “Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00361a, NMB-DIPL-00361b and NMB-DIPL-00361c).

Spirobolellus leucopygus Carl, 1926, Spirobolellidae

lifouensis Carl, 1926: 398-399, figs 44-46 [*Canacophilus* (*Canacophilus*)].

Loyalty-Inseln: Lifou, April 1912; Maré, Dez. 1911. One ♂ and more than one ♀.

No specimens found in the MHNG. There are five syntypes (one ♂ and four ♀ referred to as “Typus” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00351a and NMB-DIPL-00351b).

Canacophilus lifouensis Carl, 1926, Dalodesmidae

lividus Carl, 1914b: 956-958, figs 241-245 [*Fuhrmannodesmus*].

Paramo Cruz Verde, 3400 m. One ♂ and one ♀.

No specimens found in the MHNG. The whereabouts of the syntypes is unknown. *Fuhrmannodesmus lividus* is the type species of the genus *Fuhrmannodesmus* Carl, 1914 by monotypy (Jeekel, 1971).

Fuhrmannodesmus lividus Carl, 1914, Fuhrmannodesmidae

lombokensis Carl, 1912b: 168-169, fig. 6, text fig. C [*Rhinocricus*].

Lombok. Sadjang. Dr. J. Elbert. Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens under the name *Dinematocricus lombokensis* (MHN-ARTO-14450). Both specimens have a pin running most of the length of the body. The pencil written identification label has “Lombok (Sadjang) ♂♀ ex coll. Dr J. Elbert” written on it and there is a printed “Type” label, indicating that the specimens are part of the type series. The SMF

collection contains three ♂ and three ♀ in alcohol. The identification label in the jar has "Lombok: Sadjang, Elbert, 1909" written on it, indicating that the specimens are part of the type series. After an examination of the type specimens one ♂ (SMF 1712) was placed in a separate jar and is here designated as lectotype.

Dinematocricus lombokensis (Carl, 1912), Rhinocricidae

longipes Carl, 1913a: 222-224, figs 14-18 [*Cordyloporus*]. Idenau, Kamerun. Museum Senkenberg. One ♂ and more than one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18533). The specimen has a pin running the length of the body and is accompanied by a vial containing dissected parts including gonopods. The identification labels in the jar have "Idenau, Kamerun" and "Kamerun" written on them respectively, indicating that the specimen is part of the type series. A handwritten label in the jar states that Hoffman selected the specimen as lectotype in 1960, but it is not clear whether the designation was formally published; this specimen is hereby designated lectotype. The SMF collection contains two specimens in alcohol: a ♀ labelled "Paraty" (SMF 100) and a ♀ labelled "Typus!" (SMF 101), both of which are now paralectotypes.

Prepodesmus longipes (Carl, 1913), Chelodesmidae

luctuosus Carl, 1914b: 902-903, figs 131-133 [*Heteropeltis*].

Camelai, Kaffeepflanzung. Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18536). The specimen has a pin running the length of the body and is accompanied by a small vial containing dissected parts including gonopods. The identification labels in the jar have "La Camelia (Colombie)" and "Colombie Coll. Fuhrmann" written on them respectively, indicating that the specimen is a syntype. The whereabouts of the other syntypes is unknown. *Heteropeltis luctuosus* is the type species of the genus *Heteropeltis* Carl, 1914 by monotypy (Jeekel, 1971).

Heteropeltis luctuosus Carl, 1914, Chelodesmidae

lugubris Carl, 1909b: 305-307, pl. 6, figs 16-17 [*Oxydesmus*].

Kampala (Uganda), einzeln unter faulenden Palmstämmen in einem Sumpftälchen. Two ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18548). The specimen, which has a pin running the length of the body, is accompanied by a small vial containing gonopods. The data label has "Kampala in eine Marsch I.09" written on it and the identification labels in the jar have "Kampala" and "type! Kampala Dr J. Carl" written on them respectively, indicating that the specimen is a syntype. The whereabouts of the other syntypes is unknown.

Coromus lugubris (Carl, 1909), Oxydesmidae

macassarensis Carl, 1912c: 198-199, text fig. 35 [*Rhinocricus*].

Makassar, Süd-Celebes (coll. Sarasin). Two ♂ and two ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14319). The identification labels have "Celebes merid. ex coll. Sarasin" and "type Celebes merid. ex coll. Sarasin" written on them respectively, indicating that the specimen is a syntype. The other three syntypes (referred to as "Typen" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00166a).

Acladocricus macassarensis (Carl, 1912), Rhinocricidae

macracanthus Carl, 1941b: 685-690, figs 185-194 [*Thyropygus*].

Anaimalais: Kaffeepflanzung Naduar, ob Valparai, 1400 m; Talboden von Valparai, 1100 m, III.1927, unter Stämmen und im Mulm. Two ♂ and an unspecified number of juvenile ♀.

The MHNG collection contains 17 specimens in alcohol in five vials. The first tube (MHNG-ARTO-14496) contains one specimen broken into four pieces, and a label with "Thyropygus macracanthus Carl, ♂ forma B. Valparai III.27" written on it. The second vial (MHNG-ARTO-14497) contains one specimen broken into six pieces and a smaller vial containing some partially dissected segments. The label has "Thyropygus macracanthus Carl ♂ type Naduae Estate" written on it. The third tube (MHNG-ARTO-14498) contains one specimen broken into two pieces and labels with "Thyropygus macracanthus Carl, ♀ var. de sculpture! Valparai 4.III.27" and "♀ 58 seg. voir sculp. et antennes" written on them respectively. The fourth vial (MHNG-ARTO-14499) contains four specimens, all broken, and labels with "Thyropygus macracanthus Carl, ♀♀ 57-59 segm. Naduar s. Valparai III.27", "Valparai Naduar Estate 7.III" and "♀♀ 57-59 segm^{te}, ♀ juv. 56 segm., 2 beinlos" written on them respectively. The fifth vial (MHNG-ARTO-14500) contains ten specimens, all broken, and labels with "Thyropygus macracanthus Carl, ♀♀ 57-59 segments, juvi, Valparai Anaimalais" and "♀♀ 57-59 segm^{te} auch die keinsten!" written on them respectively. All of these specimens are from localities mentioned in the description and are syntypes. There are also two microscope slide preparations; 1) a slide (MHNG-ARTO-14501) with the telopodites of the gonopods of the ♂ from Naduar; 2) a slide (MHNG-ARTO-14502) with the gonopods, antenna and first pair of legs of the other ♂. The differences between Carl's a and b varieties were discussed in the description, but the forms were not described and named separately.

Gnomognathus macracanthus (Carl, 1941), Harpagophoridae

major Carl, 1914a: figs 1, 4-6 [*Stemmatoius*].

No locality or series information (illustration only).

Carl (1914b: 851-853, figs 24, 26-29, 55-61) provided

a description of ♂ and ♀ and gave the locality “La Camelia, Kaffeepflanzung bei Angelopolis.” The MHNG collection contains two specimens in one vial and two vials containing dissected parts in alcohol. The first vial (MHNG-ARTO-14492) contains two specimens, one with a pin running the length of the body. The second vial (MHNG-ARTO-14493) contains detached legs and gonopods of more than one specimen, and a “♂” label. The third vial (MHNG-ARTO-14494) contains detached legs and other fragments, and a “♀” label. The identification labels in the jar have “Colombie” and “Colombie Fuhrmann” written on them respectively and there is a printed “Cotype” label, indicating that the specimens are syntypes. There are two further ♀ syntypes in the NMB (inventory number NMB-DIPL-00211a).

Stemmiulus major (Carl, 1914), Stemmiulidae

malayus Carl, 1909a: 263-265, figs 12-14 [*Spirostreptus* (*Thyropygus*)].

Java. L. Zehntner (Genfer Museum). Unspecified number of ♂.

The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-14495). All but one of the specimens is broken, some into many pieces, and they are accompanied by a small vial containing a gonopod. The identification labels in the jar both have “Java Zehntner” written on them, indicating that the specimens are syntypes.

Gonoplectus malayus malayus (Carl, 1909), Harpagophoridae

mareesi Carl, 1909b: 300-302, pl. 6, fig. 2 [*Cordyloporus*].

Vom Kagera durch die Südecke von Karagwe bis Mabira, im Busch auf dem Boden des Graslandes häufig. Mabira-Njarowungo in Ussuwi, im Wäldchen an trockenem Flusslauf. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol. The specimens have pins running the length of the body, and are placed in separate vials (MHNG-ARTO-14274, MHNG-ARTO-14275, MHNG-ARTO-14276 and MHNG-ARTO-14277). One of the vials (MHNG-ARTO-14274) also contains a smaller vial with the gonopods of the specimen. The data label has “Mabira-Niarowungo, XI.09, Wäldchen am Flussufer” written on it and the identification labels have “mareesi n. sp.” and “types Ost-Ussuwi Dr J. Carl” written on them respectively, indicating that the specimens are part of the type series. The tube with the dissected specimen is labelled as the lectotype, but this designation does not appear to have been published, and the specimens are syntypes. There are two syntypes in the ZMUH (Weidner, 1960), one in the MCZL, one in the ZMHB (Moritz & Fischer, 1978a) and one (referred to as “Co-Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00172a).

Morphotelus mareesi (Carl, 1909), Chelodesmidae

martini Carl, 1902: 599-600, pl. 10, fig. 34 [*Pseudoprionopeltis*].

Melbourne, Konsul Martin (Genfer Museum). One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14278). The identification labels have “Melbourne, Mr Martin” and “type Melbourne, Mr Martin” written on them respectively, indicating that the specimen is the holotype. There is also a microscope slide preparation of the gonopods (MHNG-ARTO-14278a).

Lissodesmus martini (Carl, 1902), Dalodesmidae

matarae Carl, 1941b: 658-660, figs 127-134 [*Harpurostreptus*].

Süd-Ceylon: Cocosnuss-Pflanzung bei Matara, V.1927. Four ♂ and ♀.

The MHNG collection contains nine specimens in alcohol in five vials. The first vial (MHNG-ARTO-14442) contains a broken specimen which has a pin that ran the length of the body projecting from the largest piece, and a smaller vial with gonopods. The second vial (MHNG-ARTO-14443) contains one specimen which has been partially dissected. The third vial (MHNG-ARTO-14444) contains a broken specimen with the pieces secured on three pins. The fourth vial (MHNG-ARTO-14445) contains a specimen with a pin running the length of the body and a smaller vial holding the head and anterior body rings. The fifth vial (MHNG-ARTO-14446) contains four specimens. One of the identification labels in the jar has “Inde mérid” written on it, but the one in Carl’s writing has “Matara, Ceylan mérid.” and the labels in the vials all have “Matara” written on them, most with the data as well, indicating that they are syntypes.

Harpurostreptus matarae Carl, 1941, Harpagophoridae

mayori Carl, 1914b: 873-875, figs 94-97 [*Microspirobolus*].

La Camelia, Kaffeepflanzung bei Angelopolis, 1800 m. Unspecified number of ♂ and ♀.

The MHNG collection contains a number of dissected parts, including gonopods, in a vial in alcohol (MHNG-ARTO-14421). A label in the vial containing these parts has “Microspirob. mayori Carl ♂” written on it and a label in the jar is a photocopy of an original label with “Diplopodes de la Colombie, Pièces anatomique (J. Carl, 1914)” written on it, indicating that the remains belonged to one or more syntype(s). The whereabouts of the other syntypes is unknown.

Spirobolellus mayori (Carl, 1914), Spirobolellidae

mecheli Carl, 1902: 650-652, pl. 11, figs 58-61 [*Platyrrhacus*].

Indragiri (Sumatra), A. v. Mechel (Basler Museum). Three ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14347). The specimen has a pin running the length of the body and is accompanied by a small vial containing the gonopods. The identification labels have

“Sumatra, A. v. Mechel” and “type Sumatra, A. v. Mechel, Doubl. du Musée de Bâle” written on them respectively, indicating that the specimen is a syntype. The other two ♂ syntypes are in the NMB (inventory number NMB-DIPL-00441a). *Platyrrhachus mecheli* was designated as the type species of *Kainorhacus* Jeekel, 2007 in the original description of the genus.

Kainorhacus mecheli (Carl, 1902), Platyrrhacidae

mediovirgata Carl, 1941a: 364-366, figs 7-8 [*Orthomorpha* (*Orthomorpha*)].

Nördliche Chin-Hills, in Ober-Birma. E. G. Watson leg. British Museum. One ♂.

No specimens found in the MHNG collection. The holotype is in the BMNH.

Antheromorpha mediovirgata (Carl, 1941), Paradoxosomatidae

medius Carl, 1902: 675-676, pl. 12, figs 105-106 [*Sphaeriodesmus*].

Guatemala, Dr. Oltramare (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains seven specimens in alcohol in two vials. One vial (MHNG-ARTO-18239) contains a broken specimen and a smaller vial containing gonopods. The tube has a label with “*Sphaeriodesmus medius* Carl 1902, Taf. 12, Fig. 105” handwritten by Carl in pencil, and a label with “Lectotypus! Sig. Hoffman 79” handwritten in pencil. The other vial (MHNG-ARTO-18240) contains six specimens, four of them broken, and a label with “Guatemala, Dr Oltramare” handwritten in pencil. The identification labels in the jar have “Guatemala” and “Guatemala, Oltramare” written on them respectively. Hoffman (1999: 412) refers to a ♂ holotype in the MHNG, presumably referring to the specimen he had labelled as lectotype, but no lectotype designation has been published and all of the specimens are syntypes.

Sphaeriodesmus medius Carl, 1902, Sphaeriodesmidae

mertoni Carl, 1912a: 273-274, figs 10-13 [*Trigoniulus*].

Aru-Archipel: Wald Dobo-Wangil, Wammer; Wardakau, Maikoor. Unspecified series, only ♂ mentioned explicitly. No specimens found in the MHNG collection. The SMF collection contains two specimens in alcohol in separate jars. One contains a ♂ with dissected gonopods in a microvial (SMF 1368, here designated lectotype) and “Aroe: Ins. Wammerm H. Merton, 1908” written on the identification label. The other contains a ♂ with dissected gonopods in a microvial (SMF 1392) and “Aroe, H. Merton” written on the identification label. *Trigoniulus mertoni* was designated the type species of the genus *Arostrophus* Chamberlin, 1920 in the original description of the genus.

Arostrophus mertoni (Carl, 1912), Pachybolidae

mimicus Carl, 1941b: 608-610, figs 59-64 [*Komphobolus*]. Palnis: Tigershola, zwischen Shembaganur und Maryland, unter der Rinde von Baumstrünken, 1650 m, 18.IV. One ♂, two ♀ and one juvenile.

The MHNG collection contains four specimens, three of them broken, in alcohol (MHNG-ARTO-14422). There is a data label with “Tiger-Shola bei Maryland 18.IV. unter Borke” written on it in pencil and the identification labels have “Palnis” and “Tigre-Shola (Palnis) 18.IV.27, sous l’écorce de branches pourries” written on them respectively, indicating that the specimens are syntypes. There is also a microscope slide preparation of two anterior and one posterior gonopod (MHNG-ARTO-14423). *Komphobolus mimicus* is the type species of the genus *Komphobolus* Carl, 1941 by monotypy (Jeekel, 1971).

Komphobolus mimicus Carl, 1941, Pachybolidae

minor Carl, 1909a: 260-261, figs 7-8 [*Spirostreptus* (*Thyropygus*)].

Java. L. Zehntner. Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-14503). All of the specimens are broken, some of the fragments having pins projecting from them. One specimen has been separated and is labelled “Lectotypus! sig. Hoffman 1975”. There is also a small vial containing gonopods. The original identification labels both have “Java Dr L Zehntner” written on them, and there is also an undated label with “*Remulopygus minor* (Carl) Harpagophoridae (Types!)” typewritten on it, indicating that the specimens are part of the type series. The lectotype designation does not appear to have been published and the specimens are therefore syntypes. *Remulopygus minor* (Carl, 1909), Harpagophoridae

minusculus discretus Carl, 1941b: 709-711, figs 211-212, 222-223 [*Thyropygus*].

Untere Palnis: Tandikudi, 1500 m, Cardamum-Pflanzung, Schattenkultur, unter Holz; Maryland, 1600 m, Kaffeepflanzung, 20.IV. Obere Palnis: Pambarai, 1900 m in faulem Stroh; Kleine Shola gegenüber Kukkal, 1900 m, 2.IV. Anaimalais: Valparai, 1100 m. Unspecified number of ♂ and ♀.

The MHNG collection contains 19 specimens in alcohol in seven vials. The first vial (MHNG-ARTO-14513) contains one specimen and labels with “Thyr. minusculus discretus Carl ♂ ad. 59 segments, Maryland (Palnis inf.) 20.IV” and “Kafee-Estate bei Maryland 20.IV ♂ 59 segm.” written on them respectively. The second vial (MHNG-ARTO-14514) contains one specimen, a smaller vial containing the head, segments with gonopods and other dissected parts, and a label with “Thyr. minusculus discretus Carl ♂ cotype, Tandikudi P. inf., voir dessin praefemur I ♂” written on it. The third vial (MHNG-ARTO-14515) contains one specimen, a smaller vial containing the head, some legs and other dissected parts, and a label with “Thyr. minusculus discretus Carl ♀ 61 segm. ob Pambaraital, in faulem Stroh” written

on it. The fourth vial (MHNG-ARTO-14516) contains one specimen and labels with “Thyr. minusculus discretus Carl ♀ 62 segm. Kukkal 2.IV” and “Kleine Shola, gegen Kukkal 2.IV ♀ Skulptur von spec. E” written on them respectively. The fifth vial (MHNG-ARTO-14517) contains one specimen and labels with “Thyr. minusculus discretus Carl ♂ immat. Valparai (Anaimalais) III.27”, “Valparai III.27” and “Skulptur von spec. E” written on them respectively. The sixth vial (MHNG-ARTO-14518) contains seven specimens and labels with “Thyr. minusculus discretus Carl ♀♀, juvs. Tandikudi (Cardamum-Pflng.) unter Holz” and “Tandikudi Cardamon-Estate unter Holz” written on them respectively. The seventh vial (MHNG-ARTO-14519) contains seven specimens, two of them separated in a smaller vial, a second smaller vial with gonopods and other dissected parts, and a label with “Thyr. minusculus discretus Carl ♂♂ cotypes, 63-66 segments, Tandikudi, Palnis inférieurs, (Cardamum-Estate) unter Holz” written on it. Although only one of the labels makes an explicit reference to type status, the localities correspond to those listed in the description and all of these specimens are syntypes.

Gnomognathus minusculus discretus (Carl, 1941), Harpagophoridae

minusculus striatus Carl, 1941b: 706-709, figs 209, 219-221 [*Thyropygus*].

Obere Palnis: Vandaravu, 2350 m, kleine Shola, beim Rasthaus. One ♂.

The MHNG collection contains 18 specimens in alcohol in two jars. The first jar (MHNG-ARTO-14509) contains a vial holding a specimen broken in to two large pieces accompanied by a small tube containing gonopods, the head and other dissected parts. The labels in the tube have “Thyropygus minusculus striatus Carl, ♂ type Vandavaru R.F” and “Harp. sp. G, ♂ type 52 segm. Vandavaru F.R. 8.IV” written on them, indicating that this specimen is the holotype. The second jar (MHNG-ARTO-18640) contains five vials of specimens collected by Carl and listed in the original description, but which were excluded from the type series by Carl’s in habitual nomination of the ♂ from Vandaravu with 52 segments as the “typus”.

Gnomognathus minusculus striatus (Carl, 1941), Harpagophoridae

minusculus suspectus Carl, 1941b: 704-705, figs 206, 208, 216-218 [*Thyropygus*].

Obere Palnis: Kukkalshola, 1900 m, 1.IV, ♂ Type, 61 Segmente; ♀ Type, 58 Segmente, 3 mm dick. One ♂ and one ♀.

The MHNG collection contains the two specimens in alcohol (MHNG-ARTO-14510). One of the specimens is broken, and they are accompanied by three small vials; one holding two body rings with gonopods, the head and other fragments, one with ♂ second and third legs and

one with the ♀ second legs. The label in the larger vial reads “Thyr. min. suspectus Carl, Kukkalshola 1.IV.27, ♂ type 61 segm., ♀ 58 segm (= G)”, indicating that the specimens are the syntypes. The MHNG also has two vials of specimens collected by Carl and listed in the original description but not identified therein as type specimens.

Gnomognathus minusculus suspectus (Carl, 1941), Harpagophoridae

minusculus vicinus Carl, 1941b: 703, figs 205, 210, 215 [*Thyropygus*].

Obere Palnis: Lichter Akazienhain bei Pumbarai, 1900 m, unter Holz und Stein. Two ♂ and an unspecified number of ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14508). One of the specimens is broken, and there is a small vial with gonopods and a head and anterior segments. The labels in the larger vial have “Lichter Mimosahain bei Pumbarai F.R. 28.III unter Holz und Stein” and “Thyr. minusculus vicinus Carl ♂♀ types. Mimosahain bei Pumbarai F.R. 28.III unter Holz und Stein” written on them respectively, indicating that the specimens are syntypes. The whereabouts of the other syntype(s) is unknown.

Gnomognathus minusculus vicinus (Carl, 1941), Harpagophoridae

minuta Carl, 1922: 568-569, figs E-F [*Siphonophora*].

Maxwells Hill (Distrikt Perak). Malakka, in Mulm, 4000’ ü. M. One ♂.

The MHNG collection has a microscope slide preparation of the gonopods of the holotype (MHNG-ARTO-14534). The rest of the specimen is in the ZMHB collection (Moritz & Fischer, 1978b).

Gonatotrachus minutus (Carl, 1922), Siphonophoridae

minutus Carl, 1932: 506-508, figs 142-149 [*Akreiodesmus*].

Nilgiris: Coonoor, 1700 m, bei *Camponotus* spec. One ♂. The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18606). The specimen is accompanied by a small vial containing fragments of dissected parts. The data label has “Coonoor” written on it, and the identification label has “♂ type” written on it, indicating that the specimen is the holotype. The genus name *Akreiodesmus* Carl, 1932 is unavailable because no type species was designated. *Akreiodesmus minutus* was subsequently designated the type species of the genus *Akreiodesmus* Attems, 1940 by Attems (1940).

Akreiodesmus minutus Carl, 1932, Pyrgodesmidae

minutus Carl, 1926: 433-435, figs 102-105 [*Spirobolellus*].

Neu-Caledonien: Mt. Canala, Wald; Mt. Canala, Wald, bei 700 m, Sept. 1911. Unspecified number of ♂ and ♀. The MHNG collection contains three specimens in alcohol

(MHNG-ARTO-14335). Two of the specimens have a pin running the length of the body. The identification label has "Mt Kanala [sic] 800-100 m" written on it, indicating that the specimens are syntypes. There are three syntypes (two ♂ and one ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00368a and NMB-DIPL-00368b).

Spirobolellus minutus Carl, 1926, Spirobolellidae

modestus Carl, 1902: 646-648, pl. 11, fig. 66 [*Platyrhacus*].

Sumatra, Dr. W. Voltz (Berner Museum). One ♀.

No specimens found in the MHNG. The holotype is presumably in the NMBE.

Platyrhacus modestus Carl, 1902, Platyrhacidae

modestus Carl, 1926: 455-456, figs 145-148 [*Rhinotus*]. Neu-Caledonien: Prony, 100 m, März 1912; Mt. Yaté, ca. 500 m, März 1912. Two ♂ and one ♀.

The MHNG collection contains a slide preparation of the posterior gonopods of one of the syntypes (MHNG-ARTO-14344). The three syntypes (two ♂ and one ♀ referred to as "Typus" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00384a and NMB-DIPL-00384b).

Rhinotus modestus Carl, 1926, Siphonotidae

modestus Carl, 1926: 445-447, figs 129-132 [*Spirobolellus*].

Neu-Caledonien: Oubatche, April 1911; Hienghène; Insel Ouedjo, bei Hienghène, Juni 1911; Mt. Canala, 17. Sept. 1911; Yaté, März 1912. Unspecified number of ♂ and ♀. The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14339). Three of the specimens have a pin running the length of the body. The identification label has "Yaté Nlle. Caledonie" written on it, indicating that the specimens are syntypes. There are six syntypes (four ♂ and two ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00378a to NMB-DIPL-00378d).

Spirobolellus modestus Carl, 1926, Spirobolellidae

moenensis Carl, 1912c: 185-186 [*Rhinocricus*].

Insel Moena, im S. von S.-O.-Celebes (coll. J. Elbert). One ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14449). The specimen has a pin running the length of the anterior half. The identification labels in the jar have "cotype ex coll. Elbert, Ile Moena S.-E. de Célèbes" and "Ile Moena (ex coll. Elbert)" written on them respectively, indicating that the specimen is part of the type series. The SMF collection contains one ♂ in alcohol with dissected gonopods in a microvial (SMF 1832). The identification label in the jar has "SO-Celebes: Moena Raha, Elbert, 1909" written on it, indicating that the specimen is a type. After examination of the types, the ♂ in the SMF is here designated as lectotype.

Salpidobolus moenensis (Carl, 1912), Rhinocricidae

moniliforme Carl, 1912c: 136-139, pl. 5, figs 4-5 [*Strongylosoma*].

Gegend von Duri 400-600 m, Süd-Central-Celebes; Sadaonta, Central-Celebes; Makassar, Süd-Celebes; Süd-Ost-Celebes; Kema, Nord-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14306). One of the identification labels has "types, Sadaonta/Celebes centr. ex coll. Sarasin" written on it, indicating that the specimens are syntypes. There are around ten syntypes in the NMB (inventory numbers NMB-DIPL-00130a to NMB-DIPL-00130d) under the name *Helicorthomorpha moniliformis* (Carl).

Helicorthomorpha orthogona moniliformis (Carl, 1912), Paradoxosomatidae

monomorphum Carl, 1913a: 206-207 [*Strongylosoma*].

Weg zwischen Baiima und Pendambo (östliches Sierra-Leone) 18.VI.06. 15 ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18567). One of the specimens has a pin running the length of the body. The identification labels in the jar have "S. E. de la Sierra Leone Volz" and "Sierra Leone Volz" written on them respectively, indicating that the specimens are syntypes. The other syntypes are presumably in the NMBE.

A junior synonym of *Xanthodesmus physkon* (Attems, 1898), Paradoxosomatidae

monstruosus Carl, 1932: 487-489, figs 109-113 [*Coonorophilus*].

Nilgiris: Kleine Dschungel unterhalb Coonoor, 1500 m, zwischen Laub und Moder, 24.XII, ♀ typus; Elkhil, 2400 m, Shola unter Steinen, 19.I.27; Dodabetta Reserved Forest, 2400 m, unter faulem Holz, 11.I.1927; Avalanche, 1800 m. Unspecified series.

The MHNG collection contains eight specimens in alcohol in two jars. The first jar (MHNG-ARTO-18586) contains a vial with two smaller vials in it. One tube holds fragments of a specimen and has a label with "Fragments ♂♀ typus!" written on it, the other holds a gonopod. The identification label in the larger tube has "♀♂ type Coonoor 24.XII" written on it, corresponding to locality data given for the specimen designated as the type. The second jar (MHNG-ARTO-18587) contains two vials, each with several specimens with different locality labels separated by cotton wool plugs. The first vial contains two specimens with the data label "Nilgiris, Elkhil 19.I.27" and two specimens with the data label "Nilgiris Dodabetta R.F." The second vial has one specimen with the data label "Nilgiris Avalanche" and two specimens with the data label "Nilgiris Coonoor". In the text of the original description Carl states that his type is a gynandromorph. The other specimens could be considered paratypes. *Coonorophilus monstruosus* is the type species of the genus *Coonorophilus* Carl, 1932 by monotypy (Jeekel, 1971).

Coonoorophilus monstruosus Carl, 1932, Fuhrmannodesmidae

montanus Carl, 1926: 419-421, figs 73-75 [*Spirobolellus*]. Neu-Caledonien: Mt. Canala 700-1100 m, 4. Nov. 1911; Mt. Humboldt 1200-1600 m (Gipfel), 17.-18. Sept. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-14325), one is broken and two have pins running the length of the body. The identification label has "Mt Kanala [sic] Nlle. Caledonie" written on it, indicating that the specimens are syntypes. There are four syntypes (two ♂ and two ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00360a and NMB-DIPL-00360b).

Spirobolellus montanus Carl, 1926, Spirobolellidae

montigena Carl, 1935: 330-333, figs 9-14 [*Strongylosoma*].

Darjeeling (Sikkim), 7000', 13.III. One ♂ and one ♀.

No specimens found in the MHNG collection. The type specimens are in the BMNH.

Substrongylosoma montigena (Carl, 1935), Paradoxosomatidae

montivagum Carl, 1912c: 133-135 [*Strongylosoma*].

Südliche Vorberge des Tokalekadjo ca. 1000 m, Central-Celebes (coll. Sarasin). Two ♀.

No specimens found in the MHNG collection. The two ♀ syntypes (referred to as "Typus" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00128a).

Strongylosoma montivagum Carl, 1912, Paradoxosomatidae

montivagus Carl, 1941b: 660-663, figs 135-139 [*Harpurostreptus*].

Untere Palnis: Passübergang westlich von Tandikudi, 1550 m, trockener Busch, unter Steinen, V.1927. One ♂ and three ♀.

The MHNG collection contains four specimens in alcohol in two vials. The first vial (MHNG-ARTO-14447) contains a broken specimen and a smaller vial with the head, a few segments and the gonopods. The second vial (MHNG-ARTO-14448) contains three specimens, two broken and one with a pin running the length of a body, and a smaller vial containing the head and anterior segments of one of the specimens. The identification labels in the jar have "types Palnis inf. (Inde mérid.) J. Carl" and "types Palnis inf. Voy. J. Carl" written on them respectively, indicating that the specimens are syntypes. *Harpurostreptus montivagus* Carl, 1941, Harpagophoridae

montivagus Carl, 1902: 662-664, pl. 12, figs 84-88 [*Platyrrhacus*].

Volcan de Turrialba (Costarica) 2000 m ü. Meer, P. Biolley (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-15118). The identification labels have "Costarica, P. Biolley" and "types ♂♀ Costarica, P. Biolley" written on them respectively, indicating that the specimens are syntypes. There is a further syntype in the NMB (inventory number NMB-DIPL-00443a).

Platyrrhacus montivagus Carl, 1902, Platyrrhacidae

montivagus Carl, 1912c: 174-176 [*Rhinocricus*].

Südabfall der Matinangkette, ca. 1000 m ü. M., Nord-Celebes (coll. Sarasin). Two ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14311). The identification labels have "♂ cotype N. de Celebes" and "cotype Celebes sept." written on them respectively, indicating that the specimen is a syntype. The second ♂ syntype (referred to as "Typ" in the NMB catalogue) is in the NMB (inventory number NMB-DIPL-00155a). *Rhinocricus montivagus* Carl, 1912 is a junior homonym of *R. montivagus* Silvestri, 1895, and the replacement name *R. carli* was proposed by Attems (1914: 317).

Acladocricus carli (Attems, 1914), Rhinocricidae

mortoni Carl, 1909a: 255-258, figs 10-11 [*Platyrrhacus*]. Borneo. W. Morton. Unspecified number of ♂.

The MHNG collection contains three specimens in alcohol in two jars. The first jar (MHNG-ARTO-15124) contains one specimen accompanied by a small vial with gonopods. The identification label has "Borneo, ex coll. Morton" written on it. There is a handwritten label indicating that in 1973 Hoffman intended to designate this specimen as the lectotype, but this designation does not seem to have been formally published and the specimen is therefore a syntype. An undated typewritten label states that Hoffman identified the specimen as *Eurydirorhachis mortoni* (Carl). The second jar (MHNG-ARTO-15125) contains two broken specimens. The identification label in the jar has "Borneo (W. Morton)" written on it, indicating that the specimens are syntypes. An undated typewritten label states that Hoffman identified this specimen as *Eurydirorhachis mortoni* (Carl).

Acanthodesmus mortoni (Carl, 1909), Platyrrhacidae

mulierosus Carl, 1937: 242-249, figs 1-3 [*Diopsiulus*].

[No precise locality data]. Unspecified number of ♂ and ♀.

Carl (1941b: 586) gave the locality data "Anaimalais: Kokumalai, bei Attakatti (1000 m), im lichten Busch, unter Steinen, exponiert und trocken, III.1927." The MHNG collection contains 45 syntypes in alcohol in six vials. The first vial (MHNG-ARTO-14465) contains one specimen broken into several pieces and a label with "Diopsiulus mulierosus Carl, ♂ type!" written on it. The second vial (MHNG-ARTO-14466) contains one specimen with the anterior part of the body detached and a label with "Diopsiulus mulierosus Carl, 49 segmts., ♀ vierge, Z. Anz. 117 p. 245 (3)" written on it. The third

vial (MHNG-ARTO-14467) contains two specimens in smaller vials, both with the anterior of the body detached and labelled as “3e larve”. The fourth vial (MHNG-ARTO-14468) contains four broken specimens and a label with “Diopsiulus mulierosus Carl, types ♀, Attakatti, Zool. Anz. 214” written on it. The fifth vial (MHNG-ARTO-14469) contains 36 specimens, one of them with a pin running the length of the body, and a label with “Diopsiulus mulierosus Carl, juvs. Attakatti 3.III.27, xerophil.” written on it. The sixth vial (MHNG-ARTO-14470) contains one specimen without a label. No type was designated in the original description and so all of these specimens are syntypes. There are also seven microscope slide preparations which, while only labelled “Diopsiulus I” have “Attakatti” or “Attakatti, Kokumalai” written on the labels and are obviously part of the type series: 1) a slide (MHNG-ARTO-14471) with gonopods and legs; 2) a slide (MHNG-ARTO-14472) with a pair of ♀ third legs; 3) a slide (MHNG-ARTO-14473) with antennae and ♂ first, second and third legs; 4) a slide (MHNG-ARTO-14474) with the first, second and third legs of a juvenile ♂; 5) a slide (MHNG-ARTO-14475) with the receptacula of a ♀; 6) a slide (MHNG-ARTO-14476) of the gonopods of a nearly mature ♂; 7) a slide (MHNG-ARTO-14477) with the gonopods of an immature ♂.

Stemmiulus mulierosus (Carl, 1937), Stemmiulidae

multiannulatus Carl, 1909b: 313-314, pl. 6, figs 6, 21 [*Spirostreptus*].

Busch zwischen dem Kagera und dem Lager von Mabira in Südkaragwe. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18478). The specimen is broken into several pieces and is accompanied by a vial containing gonopods. There is a locality label with “Bei Kagera-Mabira 5.xi.08” written on it and identification labels have “Karagwe Dr. J. Carl” and “Bei Kagera-Mabira” written on them respectively, indicating that the specimen is the holotype. The proper generic placement of this species is unknown (Enghoff *et al.*, 2016).

?*Spirostreptus multiannulatus* Carl, 1909, Spirostreptidae

multistriatus Carl, 1912c: 192-193 [*Rhinocricus*].

Buol, Nord-Celebes (coll. Sarasin). One ♀.

No specimens found in the MHNG. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00163a). According to Jeekel (2001: 43) this species is in need of a revision and cannot be assigned to a genus. *Rhinocricus* is an American genus, so it is very unlikely that this species belongs to *Rhinocricus*. It was listed as *Dinematocricus*? in Chamberlin (1920) without re-examination, and Marek *et al.* (2003) transferred all *Dinematocricus* from Sulawesi to *Salpidobolus*. Until a proper revision of the type specimen is undertaken, it is best to leave this species in its original combination.

?*Rhinocricus multistriatus* Carl, 1912, Rhinocricidae

nanus Carl, 1902: 631-633, pl. 11, figs 55-56 [*Icosidesmus*].

Neuseeland, Nordinsel, Suter (Berner & Genfer Museum). Two ♂.

The MHNG collection contains one broken specimen in alcohol (MHNG-ARTO-18626). The identification labels in the jar have “N^{elle} Zélande Suter-Naef” and “N^e Zélande (Nord) Suter” written on them respectively, indicating that the specimen is part of the type series. Johns (1964: 36) designated this specimen as the lectotype. The MHNG also has a microscope slide preparation of gonopods and legs (MHNG-ARTO-18630); it is not clear if these belong to the lectotype or to the paralectotype. The paralectotype is presumably in the NMBE.

Icosidesmus (*Eparmatolophus*) *nanus* Carl, 1902, Dalodesmidae

nanus Carl, 1941b: 682-685, figs 179-184 [*Thyropygus*]. Shevaroy-Hills: Yerkaud. J. R. Henderson leg. 1894, British Museum. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol in two vials. The first vial (MHNG-ARTO-14504) contains a broken specimen in a smaller vial and labels with “Thyropygus nanus Carl ♂ cotype Yerkaud” and “P ♂ cotype” written on them respectively. The second vial (MHNG-ARTO-14505) contains three broken specimens, parts of two of which are still on pins that once ran the length of the body, and a label reading “Thyrop. nanus Carl, Yerkaud Henderson”. The locality data corresponds to that given in the original description and all of these specimens are syntypes. There are other syntypes in the BMNH.

Gnomognathus nanus (Carl, 1941), Harpagophoridae

nanus striatus Carl, 1941b: 685 [*Thyropygus*].

Shevaroy-Hills: Yerkaud. J. R. Henderson leg. 1894, British Museum. Fragments of two immature ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14506). The specimen has a pin running the length of the body and lacks the posterior part. The labels in the vial have “Th. nanus v. striatus Carl” and “var. striatus Carl ♂ juv.” written on them. The pencil identification label has “Yerkaud (Shevaroy) Henderson 1894” written on it, indicating that the specimen is a syntype. The other syntypes are in the BMNH.

A junior synonym of *Gnomognathus nanus* (Carl, 1941), Harpagophoridae

naufragus Carl, 1918: 441-444, figs 19-21 [*Eurhinocricus*].

Atoll d’Uliti; Carolines occidentales. Hanseatische Südsee-Expedition, E. Wolf leg. Muséum Senkenberg. Unspecified number of ♂ and ♀.

The MHNG contains five specimens in alcohol (MHNG-ARTO-18456). Three of the specimens have pins running the length of the body. A separate vial (MHNG-ARTO-18457) contains dissected parts including

gonopods. The identification labels in the jar have “Carolines occident. Hanseatische Südsee-Expedition (E. Wolff)” and “Carolines occid. Cotypes” written on them respectively, indicating that the specimens are syntypes. The SMF collection contains 12 specimens in alcohol (SMF 1800). The identification label has “W-Karolinen: Mogamoga a. Ulitiatoll, E. Wolf, 3.10.1909” written on it indicating that the specimens are syntypes.

Eurhinocricus naufragus Carl, 1918, Rhinocricidae

naviculare Carl, 1902: 573-575, pl. 10, figs 5-7 [*Strongylosoma*].

Sumatra, G. Autran (Genfer Museum). One ♂ and one ♀. The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18570). These are accompanied by a vial containing gonopods. The identification labels in the jar both have “Sumatra M. Autran” written on them, indicating that the specimens are the syntypes. *Strongylosoma naviculare* was designated as the type species of the genus *Sundaninella* Jeekel, 1968 in the original description of the genus.

Sundaninella navicularis (Carl, 1902), Paradoxosomatidae

neglectus Carl, 1903: 560-561 [*Acutangulus*].

Orizaba, Mexico. Unspecified series.

The MHNG collection contains fragments of at least two specimens in alcohol in two vials. The first vial (MHNG-ARTO-18552) contains a smaller vial of fragments and has an old data label with “Orizaba, Mexique” written on it. There are two handwritten identification labels with “Acutangulus neglectus Carl” and “Strongylosoma coccineus S. et H. ♀” written on them respectively. The second vial (MHNG-ARTO-18553) contains a smaller vial of fragments and an old data label which has once been secured on a pin and is largely illegible although “Orizaba” is just discernible. There are two handwritten identification labels with “Acutangulus neglectus Carl” and “Strongylosoma coccineus S. et H. ♂” written on them. These specimens are syntypes. Carl gave this name to the specimens referred to as *Polydesmus coccineus* var. by Saussure & Humbert (1872) which he recognised as a distinct species when revising the specimens.

Acutangulus neglectus Carl, 1903, Rhachodesmidae

neglectus Carl, 1919: 391-392, figs 17-22 [*Saussurobolus*].

Cuernavaca. Unspecified series.

The specimens upon which Carl based his description were identified as *Spirobolus nietanus* Saussure, 1860 by Saussure & Humbert (1872), but Carl (1919: 391) found that the posterior gonopods were distinct from those of the type specimen. The type specimens of *S. neglectus* could not be located, but might be mixed with fragments of *S. nietanus* in alcohol in the MHNG collection (see Hollier *et al.*, 2017).

Centrelus neglectus (Carl, 1919), Atopetholidae

neglectus Carl, 1902: 676-677, pl. 12, figs 107-108 [*Sphaeriodesmus*].

Mexico (Genfer Museum). Two ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18241). Both have pins running the length of the body and both are broken. The vial containing the specimens has a label with “Sphaeriodesmus neglectus n. sp.” handwritten in pencil in it. A second vial (MHNG-ARTO-18242) contains a smaller vial with gonopods and a label with “Sphaeriodesmus neglectus Carl, 1902 Pl. 12, Fig. 107” handwritten in pencil. The identification label in the jar has “Mexique” written on it. These specimens are syntypes.

Sphaeriodesmus neglectus Carl, 1902, Sphaeriodesmidae

neglectus Carl, 1909a: 270-271, figs 23-24 [*Spirostreptus* (*Thyropygus*)].

Java (L. Zentner, Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-14507). All but two of the specimens are broken. They are accompanied by two small vials, each containing gonopods. The identification labels in the jar have “Java, Dr L. Zehntner” written on them, indicating that the specimens are syntypes. There is an undated typed label indicating that Hoffman had identified the specimens as *Remulopygus neglectus* (Carl).

Remulopygus neglectus (Carl, 1909), Harpagophoridae

negotiosus Carl, 1941b: 667-670, figs 153-158 [*Thyropygus*].

Mysore. British Museum. One ♂.

No specimens found in the MHNG collection. The holotype is in the BMNH.

Phyllogonostreptus negotiosus (Carl, 1941), Harpagophoridae

niger Carl, 1914b: 963-965, figs 259-262 [*Trigonostylus*].

Bocca del Monte (Tambo), ca. 2000 m. One ♂.

The MHNG collection contains parts of two specimens in separate vials in alcohol. The first vial (MHNG-ARTO-18622) contains dissected parts including gonopods. The second vial (MHNG-ARTO-18623) contains a specimen with a pin running the length of the body. The identification labels in the jar have “♀ Tambo (Colombie) ex Coll. Fuhrmann” and “Colombie coll. Fuhrmann” written on them respectively. The intact specimen is the ♀ mentioned after the description as being probably conspecific with the holotype and is not part of the type series. The dissected parts must belong to the holotype but the whereabouts of the rest of the specimen is unknown.

Cyrtodesmus niger (Carl, 1914), Cyrtodesmidae

nigricornis Carl, 1926: 430-431, figs 94-96 [*Spirobolellus*].

Neu-Caledonien: Négropo-Tal, 3. März 1912; Neoi-Tal, 16. Sept. 1911. Three ♂ and three ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14333). The specimen has a pin running the length of the body. The identification label has “Negropotal” written on it, indicating that the specimen is a syntype. There are four syntypes (two ♂ and two ♀ referred to as “Typ” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00366a and NMB-DIPL-00366b).

Spirobolellus nigricornis Carl, 1926, Spirobolellidae

nigrita Carl, 1914b: 863 [*Epinannolene*].

Alto San Miquel, 2000 m, Central-Cordillere. One ♀.

No specimens found in the MHNG. The whereabouts of the holotype is unknown.

Epinannolene nigrita Carl, 1914, Pseudonannolenidae

nigrovirgatum Carl, 1902: 567-569, pl. 10, figs 1-2 [*Strongylosoma*].

Melbourne, Konsul Martin (Genfer Museum).

Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18571), one of them broken. Both of the identification labels in the jar have “Melbourne M. Martin” written on them, indicating that the specimens are part of the type series. Decker *et al.* (2017) designated the ♂ as the lectotype and the ♀ as a paralectotype. *Strongylosoma nigrovirgatum* was designated as the type species of *Pogonosternum* Jeekel, 1965 in the original description of the genus.

Pogonosternum nigrovirgatum (Carl, 1902), Paradoxosomatidae

nilgirensis Carl, 1932: 477-478, figs 85, 89, 90 [*Pseudosphaeroparia*].

Nilgiris: Coonor [sic], 1600 m, im Urwald, unter Laub und Moder, 24.XII.26; schattiger Wegrund, unter Steinen auf Mulm, 4.I.27, ♂ und ♀ Typen; Dodabetta Reserved Forest, ca. 2400 m, unter faulem Holz, 11.I.27; Elk-Hill ca. 2400 m, Shola unter Steinen, 14.I.27; Avalanche, Shola, 2050 m. Unspecified number of ♂ and ♀.

The MHNG collection contains 30 specimens in alcohol in two jars. The first jar (MHNG-ARTO-18594) contains four specimens. The data label has “Coonoor 4.I Wegrund” written on it. The identification label has “*Pseudosphaeroparia nilgirensis* Carl types!” indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18595) contains two vials, each with specimens from two localities separated by a cotton wool plug. The first vial contains one specimen with a data label with “Nilgiris Avalanche R.F.” written on it and ten specimens with a data label with “Coonoor 2-4.XII petite jungle” written on it. The second vial contains two specimens, one of them broken, with a data label with “Nilgiris Elkhill Sholas 14.I.27” written on it and 13 specimens with a data label with “Nilgiris Dodabetta R.F.” written on it. The specimens in the second jar are not part of the type series.

Pseudosphaeroparia nilgirensis Carl, 1932, Fuhrmannodesmidae

nitida Carl, 1914b: 924-925, figs 175-180 [*Trichomorpha*]. La Camelia, bei Angelopolis. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens and dissected parts in alcohol in three vials. The first vial (MHNG-ARTO-18540) contains two specimens, both with a pin running the length of the body. The second vial (MHNG-ARTO-18541) contains two specimens, one with a pin running the length of the body. A third vial (MHNG-ARTO-18542) contains gonopods and legs. Both of the identification labels in the jar have “Colombie Coll. Fuhrmann” written on them, indicating that the specimens are syntypes. There are two syntypes (one ♂ and one ♀ referred to as “Co-Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00228a).

Trichomorpha nitida Carl, 1914, Chelodesmidae

nobilis Carl, 1914b: 893-894, fig. 121 [*Chondrodesmus*]. Barranquilla am Magdalena, Meereshöhe. Two ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18530). The specimen has a pin running the length of the body and is accompanied by a vial containing gonopods. The identification labels in the jar have “Colombie (Barranquilla)” and “Colombie Coll. Fuhrmann” written on them respectively, indicating that the specimen is a syntype. The whereabouts of the other syntype is unknown.

Chondrodesmus nobilis Carl, 1914, Chelodesmidae

nubilus Carl, 1941b: 628-634, figs 86-95 [*Glyphiulus*]. Anaimalais: Attakati, xerophil, IV.1927. One ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14279). Most of the body, broken into three parts, is in a small vial, while a second small vial contains the first three body rings. The identification labels have “Anaimalais” written on them and indicate that the specimen is the holotype. There is also a microscope slide preparation (MHNG-ARTO-18516) of part of the holotype: the gnathochilarium, legs and other parts with a label with “*Glyphiulus nubilus* Carl ♀ Antenn., Gnathochil., Bein 1 u 2, Vulven”.

Podoglyphiulus nubilus (Carl, 1941), Cambalopsidae

obtusangulatus Carl, 1914b: 950, figs 219-222 [*Cryptogonodesmus*].

La Camelia bei Angelopolis, 1800 m. One ♂ and one ♀. The MHNG collection contains some dissected parts in alcohol (MHNG-ARTO-18589). A label in the vial containing the parts has “♂ Gonop.” written on it while the label in the jar is a photocopy of a label with “Diplopodes de la Colombie Pièces anatomiques (J. Carl 1914)” written on it, indicating that the specimen from which the parts came was a syntype. The whereabouts of the rest of the syntypes is unknown.

Phaneromerium obtusangulum (Carl, 1914), Fuhrmannodesmidae

olivaceus Carl, 1902: 624-626, pl. 11, fig. 49 [*Icosidesmus*].

Neuseeland, Nordinsel (Berner Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18627). The identification labels in the jar have “♂ N^{elle} Zélande Suter-Naef” and “♂ N^e Zélande (Nord) Suter” written on them respectively, indicating that the specimen is a syntype. The other syntypes are presumably in the NMBE.

Icosidesmus (*Icosidesmus*) *olivaceus* Carl, 1902, Dalodesmidae

oltramarei Carl, 1902: 600-602, pl. 10, fig. 34 [*Leptodesmus*].

Guatemala, Dr. Oltramare (Genfer Museum). Two ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18537). The specimen is in fragments in a small vial. The identification labels in the jar have “Guatemala M. Oltramare” and “♂ type Guatemala M. Oltramare” written on them respectively, indicating that the specimen is a syntype. There is also a microscope slide preparation (MHNG-ARTO-18538) of gonopods with a label with “*Leptodesmus oltramarei* Carl copf.” which is presumably part of a syntype.

Leptodesmus oltramarei Carl, 1902, Chelodesmidae

orientalis Carl, 1912c: 156-158, pl. 6, fig. 35, text figs 13-14 [*Agastrophus*].

Masarang, Nord-Celebes (coll. Sarasin). Fragments of a ♂ and one ♀.

No specimens found in the MHNG. The two syntypes (referred to as “Typen” in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00141a).

Hypocambala orientalis (Carl, 1912), Cambalopsidae

ornatum Carl, 1912c: 116-118, pl. 6, figs 32-33, 41, text fig. 6 [*Castanotherium*].

Bontorio und Umgebung, Süd-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14303). One specimen has a pin running most of the length of the body. The identification labels have “Celebes coll. Sarasin” and “types Celebes coll. Sarasin” written on them respectively, indicating that the specimens are syntypes. There are three syntypes (referred to as “Typen” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00117a).

Castanotherium ornatum Carl, 1912, Zephroniidae

orophila Carl, 1941a: 361-364, figs 4-6 [*Orthomorpha* (*Orthomorpha*)].

Nördliche Chin-Hills, in Ober-Birma. E. G. Watson leg. 1893, British Museum. One ♂ and one ♀.

No specimens found in the MHNG. The syntypes are in the BMNH.

Antheromorpha orophila (Carl, 1941), Paradoxosomatidae

palnense Carl, 1941b: 576-580, figs 1-12 [*Pygmaeosoma*]. Upper Palnis: Kleine Shola bei Pumbarai, unter faulem Holz, 1900 m, 29.III.; Kukkal Shola, 1.IV.; Bombay-Shola bei Kodaikanal, 2200 m, 21.III.; Mariyan-Shola, 2300 m, 11.-14.IV.; Shola bei Vandaravu F. R., 2300 m, 6.-10.IV. Unspecified number of ♂, ♀ and juveniles.

The MHNG collection contains seven microscope slide preparations of parts of syntypes: 1) a slide (MHNG-ARTO-18523) of legs, gnathochelidium and anterior segments with a label with “*Pygmaeosoma palnense* Carl ♂, 1^{re} patte, gnathochelidium, segments 1-6” written on it; 2) a slide (MHNG-ARTO-18524) of a head with a label with “*Pygmaeosoma palnense* Carl tête ♂” written on it; 3) a slide (MHNG-ARTO-18525) of mouthparts and legs with labels with “*Pygmaeosoma palnense* ♀, pièces buccales, pattes 1 et 2, 2.II.41” and “*Traitées à la potasse caust.*” written on them; 4) a slide (MHNG-ARTO-18526) of legs with labels with “Süd-Indien, ♂ no. 1 Vandaravu, vord. Beinpaar” and “*Pygmaeosoma palnense* Carl” written on them; 5) a slide (MHNG-ARTO-18527) of head and mouthparts with a label with “*Pygmaeosoma palnense* Carl, Kopf und Mundteile” written on it; 6) a slide (MHNG-ARTO-18528) of head and legs with labels with “*Pygmaeosoma palnense* ♀, capsule cephalique, Patte 3, II.41” and “*Traitées à la potasse caust.*” written on them; 7) a slide (MHNG-ARTO-18529) of gonopods with labels with “*Pygmaeosoma palnense* Carl ♂, Palnis super.” and “Gonopoden I u. II und Fragmente von I” written on them. The MHNG collection once contained 21 syntypes in alcohol but these were loaned to William A. Sheer in 1987 and are apparently lost. *Pygmaeosoma palnense* is the type species of the genus *Pygmaeosoma* Carl, 1941 by monotypy (Jeekel, 1971).

Hendersonula palnense (Carl, 1941), Pygmaeosomatidae

palnensis Carl, 1932: 472-476, figs 75-84 [*Pseudosphaeroparia*].

Upper-Palnis: Shola bei Kodaikanal, 2200 m; Maryian-shola, unter Holz, 11.-14.IV, 2350 m; Kukkal-shola, 1.IV, 2000 m; Vandaravu-shola, 2350 m, 6.-10.IV; Sholas und Akazien-Wäldchen ob Pumbarai, 1950 m, 29.III. Lower-Palnis: Shola bei Maryland, 20.IV. 1600 m: Cardamum-Pflanzung bei Tandikudi, 23.IV., 1500 m. Travancore: Grosser Wald im oberen Vattavadai-Tal, 10.IV, 1850 m, zwischen Palnis und Anaimalais. Unspecified number of ♂ and ♀.

The MHNG collection contains 84 specimens in alcohol in two jars. The first jar (MHNG-ARTO-18597) contains five broken specimens and a small vial with dissected parts including gonopods. The data label has “Palnis sup., Kodaikanal, IV.27” written on it. The identification label has “types” written on it, indicating that the specimens

are syntypes. Although these specimens are the only ones to be labelled as types, there was no such designation in the original description and the whole series are syntypes. The second jar contains eight vials. The first vial (MHNG-ARTO-18599) contains five specimens, two of them badly broken. The data label has "Travancore, Vattavardai" written on it, indicating that the specimens are syntypes. The second vial (MHNG-ARTO-18600) contains parts of at least 20 specimens, many of them broken. The data label has "Palnis sup., Kukkal-Shola" written on it, indicating that the specimens are syntypes. The third vial (MHNG-ARTO-18601) contains parts of at least 20 specimens. The data label has "Palnis sup., Vandaravu, 6-10.IV." written on it, indicating that the specimens are syntypes. The fourth vial (MHNG-ARTO-18602) contains one broken specimen. The data label has "Palnis sup., Maryian-Shola, 11.IV." written on it, indicating that the specimen is a syntype. The fifth vial (MHNG-ARTO-18598) contains two specimens, one fragmented. The data label has "Palnis inf., Pumbarai, bosquet d'acacias" written on it, indicating that the specimens are syntypes. The sixth vial (MHNG-ARTO-18603) contains parts of at least 15 specimens. The data label has "Palnis sup., Pumbarai pet. Shola 29.III." written on it, indicating that the specimens are syntypes. The seventh vial (MHNG-ARTO-18604) contains three specimens. The data label has "Palnis inf., Tandikudi 23.IV." written on it, indicating that the specimens are syntypes. The eighth vial (MHNG-ARTO-18605) contains 13 specimens. The data label has "Palnis inf., Maryland 10.IV. ♂" written on it, and although the date on the label does not match that given in the original description the specimens are almost certainly syntypes. *Pseudosphaeroparia palnensis* was explicitly designated as the type species of the genus *Pseudosphaeroparia* Carl, 1932 in the original description.

Pseudosphaeroparia palnensis palnensis Carl, 1932, Fuhrmannodesmidae

palnensis soror Carl, 1932: 476-477, figs 87-88 [*Pseudosphaeroparia*].

Anaimalais: Naduar-Estate bei Valparai, 1200 m. One ♂. The MHNG collection contains one broken specimen in alcohol (MHNG-ARTO-18596). The data label has "Anaimalais Naduar-Estate" written on it, and the identification label has "♂ type" written on it, indicating that it is the holotype.

Pseudosphaeroparia palnensis soror Carl, 1932, Fuhrmannodesmidae

patrioticum unicolor Carl, 1902: 575-576 [*Strongylosoma*].

Sumatra (Genfer Museum). Two ♂ and one ♀.

The MHNG collection contains three specimens in alcohol in two vials. The first vial (MHNG-ARTO-18572) contains two smaller vials holding broken parts of one specimen and a label with "Lectotype ♂" written

in pencil. The second tube (MHNG-ARTO-18573) contains two smaller tubes, each holding a specimen, one of them broken. Both of the original identification labels in the jar have "Sumatra" written on them, and the specimens are the type series. There is also a microscope slide preparation of the gonopods of a type specimen (MHNG-ARTO-14537). A pencil written label in the jar states that Jeekel examined the specimens and selected the lectotype in 1976 but this designation has not been formally published and the specimens are syntypes.

Nedyopus patrioticus unicolor (Carl, 1902), Paradoxosomatidae

patruelis Carl, 1932: 527-528, figs 185-186 [*Steganostigmus*].

Palnis: Kukkal-Shola, ca. 1900 m, 1.IV, unter faulem Holz. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14280). The specimen is in a vial, separated by a cotton wool plug from the label and a smaller vial containing gonopods and other fragments. The locality label has "Palnis, Kukkalshola, 1.IV type" written on it, indicating that the specimen is the holotype.

Steganostigmus patruelis Carl, 1932, Pyrgodesmidae

peninsularis Carl, 1912c: 179-181, text fig. 19 [*Rhinocricus*].

Roembi-Mengkoka, S.O.-Celebes (coll. Elbert). Three ♂ and one ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14543). Both specimens have pins running part of the length of the body. The identification labels have "S.E. de Celebes cotypes ex coll. Elbert" and "Roembi-Mengkoka S.E. de Celebes cotypes ex coll. Elbert" written on them respectively, indicating that the specimens are part of the type series. The SMF collection contains five specimens in alcohol in two jars. One jar contains one ♂ and one ♀ (SMF 1710). The identification label has "SO-Celebes: Roembi-Mengkoka, J. Elbert, 1909" written on it, indicating that the specimens are part of the type series. The second jar contains one ♂ with dissected gonopods and two ♀ (SMF 1697). The identification label has "SO-Celebes: Roembi-Mengko, Elbert, 1909". It is likely that these specimens are those referred to by Carl after the original description of *R. peninsularis expulsus* and therefore not part of the type series.

Salpidobolus penninsularis (Carl, 1912), Rhinocricidae

peninsularis expulsus Carl, 1912c: 181 [*Rhinocricus*].

Insel Kabaena (coll. Elbert). Two ♂.

No specimens found in the MHNG collection. The SMF collection contains two ♂ in alcohol (SMF 1704). The identification label has "Insel Kabaena, Elbert, 1909" written on it, indicating that the specimens are types.

A junior synonym of *Salpidobolus peninsularis* (Carl, 1912), Rhinocricidae

perfidus Carl, 1941b: 626-628, figs 83-85 [*Aulacobolus*].
Anaimalais: Valparai, 1100 m, unter faulem Holz, III.1927. Three ♂.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-14433). The heads of two of the specimens are detached and there is a small vial containing gonopods. The data label has "Valparai 3, 4.III. unter morschen Holz ? n. sp." Written on it in pencil, indicating that the specimens are syntypes. There are also two microscope slide preparations: 1) a slide (MHNG-ARTO-14434) of gonopods and the first two pairs of legs; 2) a slide (MHNG-ARTO-14435) of the legs of the 7th, 10th and 15th segments.

Aulacobolus perfidus Carl, 1941, Pachybolidae

petersi Carl, 1914b: 952-953, figs 228-234 [*Brachycerodesmus*].

La Camelia, Kaffeepflanzung, 1800 m; Medellin, am Ufer des Porce, 1600 m. Unspecified number of ♂ and ♀. The MHNG collection contains parts of at least eight specimens in alcohol in two vials. The first vial (MHNG-ARTO-18584) contains parts of eight specimens, four of them broken and possibly incomplete. The second vial contains dissected parts and a label with "Brachycerodesmus petersi Carl ♂, VS. B'pr., Ant., Gonopodes" written on it. Both of the identification labels in the jar have "Colombie ex Coll. Fuhrmann" written on them, indicating that the specimens are syntypes. The whereabouts of other syntypes is unknown. *Brachycerodesmus petersi* is the type species of the genus *Brachycerodesmus* Carl, 1914 by monotypy (Jeekel, 1971).

Brachycerodesmus petersi Carl, 1914, Fuhrmannodesmidae

phthisicus Carl, 1912c: 196-197, text figs 33-34 [*Rhinocricus*].

Donggala an der Palos-Bai, nördl. Central-Celebes (coll. Sarasin). One ♂ and two ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14318). The identification labels both have "type Donggala (Celebes) ex coll. Sarasin" written on them, indicating that the specimen is a syntype. The other two syntypes (referred to as "Typen" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00165a).

Dinematocricus phthisicus (Carl, 1912), Rhinocricidae

phthisicus Carl, 1926: 436-437, figs 109-111 [*Spirobolellus*].

Neu-Caledonien: Mt. Panié, Wald, 500 m, 27. Juni 1911. Unspecified number of ♂ (♀ not mentioned explicitly). No specimens found in the MHNG. There are two syntypes (one ♂ and one ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00370a).

Spirobolellus phthisicus Carl, 1926, Spirobolellidae

pictum Carl, 1912c: 130-132, pl. 5, figs 1-3 [*Strongylosoma*].

Bowonglangi, 1200-1500 m, Süd-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

No specimens found in the MHNG. There are two syntypes in the NMB under the name *Celebestia picta* (Carl) (inventory number NMB-DIPL-00126a).

Tectoporus pictus (Carl, 1912), Paradoxosomatidae

pilosella Carl, 1914b: 922, figs 169-170 [*Trichomorpha*].
Medellin am Ufer des Porce, 1600 m. One ♂.

No specimens found in the MHNG. The whereabouts of the holotype is unknown.

Trichomorpha pilosella Carl, 1914, Chelodesmidae

pilosum Carl, 1912c: 114-116, text fig. 5 [*Castanotherium*].
Bontorio und Umgebung; Bowanglangi, 1200-1500 m. Süd-Celebes (coll. Sarasin). Three ♀.

No specimens found in the MHNG. The three syntypes (three ♀ referred to as "Typen" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00116a and NMB-DIPL-00116b).

Castanotherium pilosum Carl, 1912, Zephroniidae

plataleus granosus Carl, 1902: 602-604, pl. 10, fig. 34 [*Leptodesmus*].

St. José (Costarica), P. Biolley (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol (MHNG-ARTO-18539). Two of the specimens are separated into a vial, one has a pin running the length of the body and the other is broken. Three of the specimens loose in the jar are also broken. The identification labels in the jar use the orthography "Plataleus granulatus Carl." They have "St José (Costarica) P. Biolley" and "Costarica P. Biolley" written on them respectively, indicating that the specimens are syntypes.

Chondrodesmus granosus (Carl, 1902), Chelodesmidae

pleuralis Carl, 1912a: 274-275 [*Trigoniulus*].

Kei-Archipel: Kei-Dulah, Elat auf Gross-Kei. More than one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14437). The identification labels in the jar both have "Iles Key ex. coll. Merton" written on them and there is a printed "Type" label, indicating that the specimen is a syntype. This species can not be reliably placed in a genus and is in need of a revision according to Jeekel (2001: 83).

?*Trigoniulus pleuralis* Carl, 1912, Pachybolidae

plumipes Carl, 1941b: 592-595, figs 36-41 [*Diopsiulus* (*Plusiochaeturus*)].

Untere Palnis: Tandikudi, ca. 1500 m, nach Regen unter den obersten Steinen einer Mauer, IV.1927. Two ♂.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14461). Both specimens are broken.

The labels in the vial containing them have “Tandikudi III.1927 Carl leg.”, “Tandikudi” and “Diopsiulus III Tandikudi” written on them respectively, indicating that the specimens are syntypes. There are also three microscope slide preparations of parts of syntypes: 1) a slide (MHNG-ARTO-14462) of the gonopods, first three legs and gnathochilarium; 2) a slide (MHNG-ARTO-14463) of gonopods; 3) a slide (MHNG-ARTO-14464) of the first three legs. The labels on the slides give the name as *D. plumosus*, although this has been altered by Carl to *D. plumipes* on the first slide.

Stemmiulus plumipes (Carl, 1941), Stemmiulidae

pococki Carl, 1909b: 338-341, pl. 8, figs 57-58, 65 [*Odontopyge*].

Biaramuli (Ost-Ussuwi); Niakahanga (Central-Karagwe). Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol (MHNG-ARTO-18499). A specimen in several pieces is separated in a vial, two of the others are reinforced with pins and one of these is broken. The identification labels in the jar have “Biaramuli”, “Biaramuli J. Carl” and “types, Ost-Ussuwi J. Carl” written on them respectively, indicating that the specimens are syntypes. An undated printed label in the jar states that Hoffman identified the specimens as *Helicochetus pococki* (Carl). There is a syntype in the ZMUH (Weidner, 1960) and a ♂ syntype (referred to as “Paratypoid” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00181a).

Odontopyge pococki Carl, 1909, Odontopygidae

propinqua Carl, 1914b: 918, figs 160-162 [*Trichomorpha*].

La Camelia bei Angelopolis. One ♂ and one ♀.

No specimens found in the MHNG collection. The whereabouts of the syntypes is unknown.

Trichomorpha propinqua Carl, 1914, Chelodesmidae

propinquus Carl, 1902: 665-666, pl. 12, figs 80-82 [*Platyrrhacus*].

Las Delicias, Sta-Clara (Costarica) 300 m üb. M., P. Biolley (Genfer Museum). Three ♂ and one ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-15119). Two of them have pins running the length of the body. The identification labels have “Las Delicias (Costarica) P. Biolley” and “types ♂♀” written on them respectively, indicating that the specimens are syntypes. The other syntype is in the NMB (inventory number NMB-DIPL-00444a).

Barydesmus propinquus (Carl, 1902), Platyrrhacidae

ptilostreptoides Carl, 1909b: 321-323, pl. 6, figs 35-36 [*Lophostreptus*].

Buschgebiet zwischen dem Kagera und dem Lager von Mabira in Süd-Karagwe, einige Exemplare im Busch und in Bananenpflanzungen. Unspecified number of ♂ and ♀. The MHNG collection contains 25 specimens in alcohol

in two jars. The first jar (MHNG-ARTO-18474) contains the specimen designated as lectotype by Demange & Mauriès (1975: 70). The identification labels in the jar have “Süd-Karagwe J. Carl” and “Kagera-Mbira Dr J. Carl” written on them respectively. The other jar (MHNG-ARTO-18475) contains parts of at least 24 specimens, nearly all broken and several incomplete, and a small vial containing gonopods. The jar contains typewritten copies of the labels in the first jar and the specimens are paralectotypes.

Lophostreptus ptilostreptoides Carl, 1909, Spirostreptidae

pulcher Carl, 1905: 267-269, fig. 5 [*Cordyloporus*].

Cabo St Juan. Unspecified number of ♂ and ♀.

No specimens found in the MHNG collection. Andrés Cobeta (2001) could not locate any type specimens in the MNCN.

Paracordyloporus pulcher (Carl, 1905), Chelodesmidae

pulcherrimus Carl, 1909a: 258-260, figs 2-6 [*Spirostreptus*].

Ceylon, höhere Lagen, Coll. W. Morton. Two ♂ and two ♀.

The MHNG collection contains five specimens in alcohol in three jars under the name *Spirostreptus pulcherrimus* and 15 specimens in alcohol under the name *Ktenostreptus pulcherrimus*. The first jar (MHNG-ARTO-18479) contains one specimen, which has been reinforced with pins, and a vial containing gonopods. The identification labels in the jar have “Ceylan, Coll. W. Morton” and “Ceylan ex coll. Morton” written on them respectively, indicating that the specimen is a syntype. The second jar (MHNG-ARTO-18480) contains one broken specimen. The identification label has “Ceylan Col. [sic] Morton” typewritten on it, indicating that the specimen is a syntype. The third jar (MHNG-ARTO-18481) contains three specimens. The identification label in the jar has “Ceylan, Doubles” written on it and it is likely that the specimens are not part of the type series. The specimens under the name *K. pulcherrimus* were collected after the publication of the original description and are not part of the type series. The whereabouts of the other two syntypes is unknown.

A junior synonym of *Ktenostreptus annulipes* Attems, 1909, Harpagophoridae

reducta Carl, 1914b: 928-929, figs 188-189 [*Trichomorpha*].

La Camelia, bei Angelopolis. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Trichomorpha reducta Carl, 1914, Chelodesmidae

regina Carl, 1909b: 333-335, pl. 8, figs 49-50, 54 [*Odontopyge*].

Kagera bis Mabira (Süd-Karagwe); Biaramuli bis Chiavitembe (Ost-Ussuwi). Unspecified number of ♂.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18500). Two of the specimens are reinforced by pins, and they are accompanied by a vial containing gonopods. The identification labels in the jar have “Kagira-Mabira” and “types! Sud-Karagwe Dr J. Carl” written on them respectively, indicating that the specimens are syntypes. An undated typewritten label in the jar states that Hoffman identified the specimens as *Rhamphidarpoides regina* (Carl). There is a ♂ syntype in the ZMUH (Weidner, 1960) and one in the NHMW [Inventory numbers 2686 (body broken into two parts) and 9085 (fragments of two segments mounted on a microscope slide)].

Rhamphidarpoides regina (Carl, 1909), Odontopygidae

ripariensis Carl, 1912c: 186-188, text fig. 23 [*Rhinocricus*].

Posso-See; Mapane am Golf Tomini, Central-Celebes (coll. Sarasin). Two ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14314). The identification labels both have “type Celebes central, ex coll. Sarasin” written on them, indicating that the specimen is a syntype. The other two syntypes (referred to as “Typen” in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00159a).

Salpidobolus ripariensis (Carl, 1912), Rhinocricidae

riparius Carl, 1932: 495-497, figs 123-126 [*Archandrodesmus*].

Nilgiris: Mudumalai, ca. 1000 m, 5.II, Bachufer, unter Steinen. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14281). The specimen is broken into two main pieces and a number of fragments. There is no locality label, but the identification label has “♂ type” written on it, indicating that the specimen is the holotype.

Cryptocorypha riparia (Carl, 1932), Pyrgodesmidae

riparius Carl, 1914b: 888-890, fig. 117 [*Chondrodesmus*].

Bodega Central, am Magdalena, 50 m ü. M. Three ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18531). The specimen is in a vial, with a second vial containing dissected parts including gonopods. The identification labels in the jar have “Colombie” and “Colombie Coll. Fuhrmann” written on them respectively, indicating that the specimen is a syntype. The whereabouts of the other syntypes is unknown.

Chondrodesmus riparius Carl, 1914, Chelodesmidae

riparius Carl, 1902: 641-643, pl. 12, fig. 83 [*Platyrrhacus*]. Rio General (“Côté pacifique”), P. Biolley (Genfer Museum). Two ♂ and two ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-15120). Two of them have pins running the length of the body, and they are accompanied by a

small vial containing gonopods. The identification labels have “types ♂♀ Rio General, P. Biolley” and “types ♂♀ Rio General, Cote Pacifique, P. Biolley” written on them respectively, indicating that the specimens are syntypes. There is a handwritten note in the jar indicating that Hoffman intended to designate the ♂ with the gonopods removed as the lectotype in 1964, although this does not seem to have been formally published. An undated typewritten note in the jar indicates that Hoffman identified the specimens as *Tirodesmus riparius* (Carl, 1902).

Barydesmus riparius (Carl, 1902), Platyrrhacidae

rouxi Carl, 1926: 394-396, figs 39-41 [*Canacophilus* (*Canacophilus*)].

Neu-Caledonien: Nouméa, 9. April 1912; Mt. Ignambi (Wald) 800-1000 m, April 1911; Mt. Canala, 25. Okt. 1911; Insel Ouedjo, bei Hienghène, 5. Juni 1911; Oubatche, Aug. 1911; Mt. Panié (Wald), 27. Juni 1911; Hienghène, 8. Mai 1911. Loyalty-Inseln: Ouvéa, Fayaoué, Mai 1912; Lifou, Képénée, April 1912; Maré, Médou und Nétché, Dez. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol, in two vials. The first vial (MHNG-ARTO-14301) contains one specimen; the identification label has “Drs. F. Sarasin & J. Roux, N. Caled.” printed and “Insel Ouedjo bei Hienghène” written on it. The second vial (MHNG-ARTO-14302) contains three specimens, one with a pin running the length of the body. The identification label has “Drs. F. Sarasin & J. Roux” printed and “Képénée, Lifou (Loyalty)” written on it. These specimens are syntypes. There are more than 20 syntypes (♂, ♀ and juveniles referred to as “Typus” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00349a to NMB-DIPL-00349i).

Canacophilus rouxi Carl, 1926, Dalodesmidae

rouxi Carl, 1926: 447-449, figs 133-135 [*Spirobolellus*]. Neu-Caledonien: Tao, Mai 1911; Hienghène, Juni 1911; Station am Koné-Fluss, 1. Aug. 1911; Tiouaka-Tal, Aug. 1911; Mt. Canala, 17. Sept. 1911. Loyalty-Inseln: Ouvéa, Fayaoué; Lifou, Nathalo, Képénée; Maré, Nétché und La Roche. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-14340). One of the specimens has a pin running the length of the body. The identification label has “Lifou Loyalty” written on it, indicating that the specimens are syntypes. There are around 20 syntypes (♂ and ♀ referred to as “Typus” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00379a to NMB-DIPL-00379k).

Spirobolellus rouxi Carl, 1926, Spirobolellidae

rufocinctus Carl, 1932: 455-457, figs 50-51 [*Himantogonus*].

Anaimalais: Valparai, 1100 m, 4.-9.III.1927. Talboden, in

jungen Kaffeepflanzungen und frischen Rodungen, unter Stämmen.

The MHNG collection contains 17 specimens in three vials. The first vial (MHNG-ARTO-14385) contains the ♂ lectotype designated by Jeekel (1980a: 166) according to a handwritten label. The specimen has a pin running the length of the body and is accompanied by a smaller vial with the gonopods. A handwritten identification label has the locality "Valparai" written on it. The second vial (MHNG-ARTO-14386) contains five ♂ and one ♀ paralectotypes according to a handwritten label. One specimen has a pin running the length of the body, and the original identification label has the locality "Valparai, clairières" written on it. The third vial (MHNG-ARTO-14387) contains six ♂ and four ♀ paralectotypes according to a handwritten label. Two of the specimens have pins running the length of the body, and several of the others are broken. The original identification label has the locality "Valparai" written on it. *Himantogonus rufocinctus* is the type species of the genus *Himantogonus* Carl, 1932 by monotypy (Jeekel, 1971).

Anoplodesmus rufocinctus (Carl, 1932), Paradoxosomatidae

rufocinctus Carl, 1926: 428-430, figs 80-93 [*Spirobolellus*].

Neu-Caledonien: Yaté, Wald, März 1912; Nouméa. Loyalty-Inseln: Lifou, Képénéé und Naltho; Maré, Nétché, Médou, Pénélo und Ro. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-14332). The identification label has "Képéné, Lifou" written on it, indicating that the specimens are syntypes. There are more than ten syntypes (♂ and ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00365a to NMB-DIPL-00365g).

Spirobolellus rufocinctus Carl, 1926, Spirobolellidae

rufozonatus Carl, 1918: 435-436, fig. 13 [*Rhinocricus*]. Moluques. Muséum de Genève. One ♂ and two ♀.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-18462). One of the specimens is broken, and they are accompanied by a vial containing gonopods. The identification labels in the jar have "Moluques (Deyrolle)" and "Moluques types" written on them respectively, indicating that the specimens are syntypes. According to Jeekel (2001: 43) this species is in need of a revision and cannot be reliably assigned to a genus. It is very unlikely that this species belongs to the American genus *Rhinocricus*.

?*Rhinocricus rufozonatus* Carl, 1918, Rhinocricidae

rugulosa Carl, 1932: 421-424, figs 3-4 [*Orthomorpha* (*Orthomorpha*)].

Palnis: Oberes Pumbarai-Tal, ca. 1900 m, 30.III, tief unter Steinen und in faulem Stroh. – Tigershola bei

Maryland, ca. 1600 m, Wald, unter Holz, 18.-20.IV. – Kodaikanal, 24.X.1894, J. R. Henderson leg. (British Museum Nat. Hist., No. 170-171). Shevaroy: "Lone Cottage (Shevaroy)", 24.X.1894, J. R. Henderson leg., British Museum Nat. Hist., No. 169 ♂, 169a ♀.

Unspecified number of ♂ and ♀.

The MHNG collection contains 22 specimens in alcohol in two vials. The first vial (MHNG-ARTO-14393) contains eight specimens, one with a pin running the length of the body and two broken. The data label has "Palnis inf. Tigershola" written on it. The second vial (MHNG-ARTO-14394) contains 14 specimens, three with pins running the length of the body and most of the rest broken. One specimen is separated in a smaller vial and a handwritten note indicates that this specimen was studied by Jeekel in 1976. There is also a small vial with gonopods and legs and a handwritten label reading "Gonopodes ♂ pattes 3, 4, 5". The data label has "Palnis sup. Pumbarai" written on it. These specimens are all syntypes. There are further syntypes in the BMNH.

Delarthrum rugulosum (Carl, 1932), Paradoxosomatidae

ruralis Carl, 1914b: 865-867, figs 79-80 [*Spirostreptus* (*Epistreptus*)].

La Camelia, 1800 m, Kaffeepflanzung; am Magdalena bei Jirardot, 250 m; Puerto de los Pobres, am Cauca. Unspecified number of ♂ and ♀.

The MHNG collection contains six specimens in alcohol in two jars. One jar (MHNG-ARTO-18482) contains one specimen with a pin running the length of the body and a vial containing dissected parts including the head and anterior body rings and the gonopods. The identification labels in the jar are photocopies of the original labels in the second jar. They have "Camelia (Colombie) Coll. Fuhrmann" and "Colombie Coll. Fuhrmann" written on them respectively, indicating that the specimen is part of the type series. A handwritten note dated 1990 indicates that Hoffman intended to designate this specimen as the lectotype. The second jar (MHNG-ARTO-18483) contains five specimens, one with a pin running the length of the body and two broken. The identification labels in the jar have "Camelia (Colombie) Coll. Fuhrmann" and "Colombie Coll. Fuhrmann" written on them respectively, indicating that the specimens are part of the type series. The lectotype designation has apparently not been published and so all of these specimens are syntypes. There is another ♀ syntype (referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00214a).

Isoporostreptus ruralis (Carl, 1914), Spirostreptidae

sarasini Carl, 1926: 391-393, figs 29-34 [*Canacophilus* (*Canacophilus*)].

Neu-Caledonien: Mt. Humboldt, zirka 1100 m, 18. Sept. 1911; Mt. Canala, 4. Nov. 1911, Wald, 800-1000 m. Unspecified series.

The MHNG collection contains three specimens in alcohol

(MHNG-ARTO-14300). The identification labels have “Mt. Humboldt, N. Caledonie” and “Mt. Humboldt, N. Caledonie Sarasin et Roux” written on them respectively, indicating that these specimens are syntypes. There are seven syntypes (six ♀ and one juvenile referred to as “Typus” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00347a and NMB-DIPL-00347b). *Canacophilus sarasini* was designated as the type species for the genus *Canacophilus* Carl, 1926 by Attems (1940). *Canacophilus sarasini* Carl, 1926, Dalodesmidae

sarasini Carl, 1926: 449-450, figs 136-137 [*Spirobolellus*]. Neu-Caledinien: Pam, Juli 1911; Diahotal nach Col Porori, 7. Mai 1911; Tschalabel, 5. Mai 1911; Oubatche, April 1911; Tao, 24. Mai 1911; Hienghène, Juni 1911; Koné, Aug. 1911; Bourail, Jan. 1912. Unspecified number of ♂ and ♀.

The MHNG collection contains 17 specimens in alcohol in two vials. The first vial (MHNG-ARTO-14341) contains six specimens, one broken. The data label has “Drs F. Sarasin & J. Roux, N. Caled. Zwischen Diahotal und Col Porori, 6.V.11” written on it, and the identification label indicates that it is a new species. The second vial (MHNG-ARTO-14342) contains eleven specimens, five of them with pins running the length of the body, two broken. The data label has “Tschalabel N.-C. unter Kalkblöcken” written on it and the identification label has “n. sp. Drs F. Sarasin & J. Roux, N. Caled.” written on it. All of these specimens are presumably syntypes even though the data in the first tube do not exactly match that given in the original description. There are more than 16 syntypes (♂ and ♀ referred to as “Typus” in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00380a to NMB-DIPL-00380g).

Spirobolellus sarasini Carl, 1926, Spirobolellidae

sarasinorum Carl, 1912c: 101-102, pl. 6, fig. 36 [*Nesoglomeris*].

Loka 1000-1300 m. üb. M., Süd-Celebes (coll. Sarasin). One ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14298). The identification labels both have “type Loka, Celebes mérid., Sarasin” written on them, indicating that the specimen is a syntype. The other syntype (referred to as “Typ” in the NMB catalogue) is in the NMB (inventory number NMB-DIPL-00108a). *Nesoglomeris sarasinorum* was designated types species of the genus *Nesoglomeris* Carl, 1912 by Jeekel (1971). *Hyleoglomeris sarasinorum* (Carl, 1912), Glomeridae

sarasinorum Carl, 1912c: 144-146, pl. 5, fig. 17 [*Platyrrhacus*].

Uangkahulu-Tal Nord-Celebes (coll. Sarasin). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14309). The pencil-written identification label reads “type Uangkahulu/Celebes sept., ex coll.

Sarasin”, indicating that the specimen is a syntype. There are two syntypes (one ♂ and one ♀ referred to as “Typen” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00136a).

Erythrachus sarasinorum (Carl, 1912), Platyrrhacidae

saussurei Carl, 1909a: 261-263, fig. 22 [*Spirostreptus* (*Thyropygus*)].

“Indes orientales” (Malay. Archipel?). Unspecified number of ♂ and ♀.

The MHNG collection contains parts of at least three specimens (MHNG-ARTO-14525). One of the specimens has two pins running through the anterior of the body and another has a wooden skewer running through a fragment. The specimens are accompanied by a small vial containing gonopods and other dissected parts. The identification labels in the jar both have “Indes oriental. H. d. Saussure” written on them, indicating that the specimens are syntypes. An undated typed label indicates that Hoffman studied the specimens.

Gonoplectus saussurei (Carl, 1909), Harpagophoridae

schenkeli Carl, 1902: 628-629, pl. 11, figs 53-54 [*Icosidesmus*].

Neuseeland, Nordinsel, Suter (Basler Museum & Berner Museum). Three ♂.

The MHNG collection contains a microscope slide preparation of the gonopods of one of the type specimens (MHNG-ARTO-14299). The lectotype designated by Johns (1964: 8) and one paralectotype are in the NMB (inventory number NMB-DIPL-00464a). The other paralectotype is presumably in the NMBE.

Icosidesmus (*Icosidesmus*) *schenkeli* Carl, 1902, Dalodesmidae

sellae dentiger Carl, 1909b: 310 [*Cryptodesmus*].

Kampala (Uganda), in Sümpfen; Bukoba, Urwäldchen, unter Laub; Muruccu bei Bukoba, unter Moos am Seefer; Mabira-Njarowungo (Ost-Ussuwi), Wäldchen an Flussufern, unter sehr feuchtem Laub. Unspecified number of ♂ and ♀.

The MHNG collection contains 24 specimens in alcohol in two jars. The first jar contains three vials. The first vial (MHNG-ARTO-18578) contains five specimens, one with a pin running the length of the body and two broken. The data label in this vial has “Urwäldchen bei Bukoba” written on it and both of the identification labels in the tube have “Bukoba J. Carl” written on them, indicating that the specimens are syntypes. The second vial (MHNG-ARTO-18579) contains two specimens in a smaller vial, one with a pin running the length of the body, and a small vial holding gonopods. The data label in the larger vial has “Kampala Marsch I.09” written on it and one of the identification labels has “Kampala Dr J. Carl” written on it, indicating that the specimens are syntypes. The third vial (MHNG-ARTO-18580) contains four specimens in a smaller tube and a second vial holding gonopods.

The data label in the vial has “Mabira-Njarowungo XI.09 Wäldchen an Flussufern” written on it and one of the identification labels has “Ost-Ussuwi Dr J. Carl” written on it, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18581) contains 13 specimens, six of them broken. The identification labels in this jar are not original and both have “Niarowungo [sic] Carl” typewritten on them, indicating that these specimens are also syntypes. There are two syntypes in the ZMUH (Weidner, 1960) and three (referred to as “Cotypus var.” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00174a).

A junior synonym of *Aporodesmus sellae* Silvestri, 1907, Cryptodesmidae

semiplumbeus Carl, 1914b: 877-878, figs 103-104 [*Rhinocricus*].

Puerto de los Pobres, am Cauca-Fluss. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Rhinocricus semiplumbeus Carl, 1914, Rhinocricidae

sericatus Carl, 1912b: 165-167, fig. 5, text fig. A [*Trigoniulus*].

Lombok. Praya, Sapit und Sadjang. Viele Exemplare. Dr. J. Elbert. Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol (MHNG-ARTO-14440). One of the specimens has a pin running most of the length of the body and one is incomplete. The pencil-written identification label has “Sadajang (Lombok) ex coll. Dr J Elbert” written on it and there is a printed “Type” label indicating that the specimens are syntypes.

Trigoniulus sericatus Carl, 1912, Pachybolidae

setosus Carl, 1922: 574-576, figs N-Q [*Opisotretus*].

Santis (Distrikt Deli), Ostsumatra. In einem verlassenen Grabwespennest. One ♂.

The MHNG collection contains a microscope slide preparation of the holotype (MHNG-ARTO-14412). The body is in three main parts with the gonopods separate. *Opisotretus setosus* was designated the type species of *Carlotretus* Hoffman, 1980 in the original description of the genus.

Carlotretus setosus (Carl, 1922), Opiostretidae

similis Carl, 1917: 387-388, figs 1-2, 5-6 [*Poratophilus*].

Rikalla, Afrique méridionale orientale. One ♂ and 3 ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14282). Two of the specimens are broken, and they are accompanied by a vial containing gonopods. One of the identification labels has “Rikalla, Afrique mér. orient.” written on it. The identification labels indicate that the ♂ is the “type”, but the original description did not designate a holotype and all of the specimens are syntypes.

Zinophora similis (Carl, 1917), Harpagophoridae

simillimus Carl, 1914b: 955, fig. 240 [*Gyrophallus*].

La Camelia, Kaffeepflanzung. One ♂.

No specimens found in the MHNG collection. The whereabouts of the holotype is unknown.

Gyrophallus simillimus Carl, 1914, Fuhrmannodesmidae

simplex Carl, 1909a: 250-252, fig. 21 [*Sphaeropoeus* (*Castanotherium*)].

Java (Coll. L. Zehntner). Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-18446). The specimens are accompanied by a vial containing gonopods. The two largest specimens have a pin running the length of the body. The identification labels in the jar have “Java Zehntner” and “Java, Dr L Zehntner” written on them respectively, indicating that the specimens are syntypes.

Castanotherium simplex (Carl, 1909), Zephroniidae

simulans Carl, 1932: 506-508, figs 142-149 [*Akreiodesmus*].

Nilgiris: Urwald bei Coonoor, 1700 m, bei *Camponotus*. Lower Palnis: Maryland, 1600 m, Weide, unter Stein, bei Termiten. Two ♂ and one juvenile.

The MHNG collection contains three specimens in alcohol (MHNG-ARTO-18607). The specimens are placed in a single vial; those from the two localities are separated by a cotton wool plug. One broken male has a data label with “Palnis (type!) written on it. The other two specimens and a small vial containing dissected parts have a data label with “Coonoor juv. ♂” written on it. No holotype was designated in the original description and so these specimens are all syntypes.

Akreiodesmus simulans Carl, 1932, Pyrgodesmidae

simulans Carl, 1941b: 637-639, figs 100-103 [*Cam-balopsis*].

Nilgiris: Umgebung von Coonoor, 1500-1700 m, XII.1926, in Pflanzungen, unter Laub und Moder; Mudumalai und Gudalur, ca. 1000 m, an Bachufern, unter Laub und Steinen. Unspecified number of ♂ and ♀.

The MHNG collection contains more than 200 specimens in alcohol in five vials. The first vial (MHNG-ARTO-18506) contains 11 specimens and a vial with dissected parts including a head and gonopods. The data labels in the larger vial have “Coonoor XII.26” and “Coonoor, Lady Cameron’s Seat 29/12” written on them respectively. The second vial (MHNG-ARTO-18507) contains more than 100 specimens. The data labels in the vial have “Mudumali II.27” and “Mudumali 9.II, Bachufern, unter Laub + Steinen” written on them respectively. The third vial (MHNG-ARTO-18508) contains 36 specimens. The data labels in the tube have “Gudalur II.27” and “am Bach Gudalur, Kaffee-Estate 12.II.27” written on them. The fourth vial (MHNG-ARTO-18509) contains two groups of specimens separated by a cotton wool plug. Twelve specimens are

accompanied by a data label with “Coonor XII.26” written on it and 23 specimens are accompanied by data labels with “Coonor XII.26” and “Kleiner Djungel, Coonor 24.12” written on them respectively. The fifth tube (MHNG-ARTO-18510) contains 43 specimens. The data label in the tube has “Hill Green Estate 22/12” written on it. All of these specimens are syntypes. There are also two microscope slide preparations of parts of syntypes: 1) a slide (MHNG-ARTO-18511) of gonopods, gnathochilarium and other parts, with “Cambalopsis simulans Carl ♂ Inde merriid.” written on the label; 2) a slide (MHNG-ARTO-18512) of legs and other parts, with “Cambalopsis simulans C. ♀ Beinp. 1 2 + 3, Vulven adult” written on the label.

Trachyjulus simulans (Carl, 1941), Cambalopsidae

simulans Carl, 1935: 330, figs 7-8 [*Orthomorpha* (*Orthomorpha*)].

Rungshar-Valley (Nepal), 11,000'; 27.VI, 29.VI, 9,500'. Tropde (Thibet), 22.VI. One ♂ and three ♀.

The MHNG collection contains one specimen and dissected parts of a second specimen in alcohol (MHNG-ARTO-18558). The specimen in one small vial and some gonopods in another small vial are placed together in a larger tube with a label with “Tropde. Tibet 10,000 ft., 22.6.1924, Mt. Everest Exped. 1924 Maj. R. W. G. Hingston” written on it. The identification labels in the jar have “♀ Tropde, Tibet. gonopode ♂ de Rungshar Valley” and “Himalaya, Tibet III Everest exped.” written on them respectively. The original description calls the specimens from Nepal “Typen” (first date) and “Cotypus” (second date), but all of the specimens studied by Carl should be considered syntypes (see Jeekel, 1980c). The other syntypes are in the BMNH.

Delarthrum simulans (Carl, 1935), Paradoxosomatidae

simulans Carl, 1905: 277-278, figs 8-8a [*Spirobolus*].

Cap St Juan. One ♂.

No specimens found in the MHNG collection. According to Andrés Cobeta (2001: 70) the holotype is in the MNCN (MNCN 20.07/1148).

Spirobolus simulans Carl, 1905, Spirobolidae

socialis Carl, 1909b: 330-332, pl. 8, figs 51-52 [*Odonotopyge*].

Njarugenje-Niansa (Central-Ruanda) sehr häufig in Bananenpflanzungen; Kirehe in Kissaka (Südost-Ruanda); Busch vom Kagera durch Süd-Karagwe bis Mabira in Ost-Ussuwi; Niakahanga (Central-Karagwe) in trockenen Bananengärten; Entebbe (Uganda). Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains 53 specimens in alcohol in five jars. The first jar (MHNG-ARTO-18501) contains the lectotype designated by Demange (1988: 557). The specimen is in fragments and incomplete. There is an original label in the jar with “Niakahanga (Karagwe) trockene Schamben” written on it, indicating that

the specimen is part of the type series. The second jar (MHNG-ARTO-18502) contains one specimen. The data label has “Entebbe (Uganda)” written on it, indicating that it is part of the type series. The third jar (MHNG-ARTO-18503) contains two specimens and a vial holding dissected parts including gonopods. The photocopied identification label in the jar has “Niakahanga (Karagwe) trockene Schamben” written on it, indicating that the specimen is part of the type series. The fourth jar (MHNG-ARTO-18504) contains parts of at least 26 specimens, many of them broken and several reinforced with pins. One of the original identification labels in the jar has “types Karagwe central Dr J. Carl” written on it, indicating that the specimens are part of the type series. The fifth jar (MHNG-ARTO-18505) contains parts of at least 23 specimens, many broken and five reinforced with pins. There are also two vials with gonopods. The labels are not original but have the localities “Njarugenje”, “Njarugenje-Nainsa”, “Pori Kagera Mabira” and “Kirehe-S.O. Ruanda” typewritten on them, indicating that the specimens are part of the type series. There is a ♂ paralectotype in the ZMUH (Weidner, 1960), three paralectotypes (two ♂ and one ♀) in the NMB (inventory number NMB-DIPL-00180a) and three paralectotypes in the MCZL.

Haplothysanus socialis (Carl, 1909), Odontopygidae

socialis Carl, 1912c: 139-142, pl. 5, figs 13-15 [*Prionopeltis*].

Bontorio, Süd-Celebes (Dr J. Elbert). Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol in two vials. The first vial (MHNG-ARTO-14307) contains three specimens, each with a pin running the length of the body, an identification label with “Bontorio, Celebes mér. ex coll. Sarasin [sic]” written on it and a label “species 1”. The other vial (MHNG-ARTO-14308) contains a single specimen with the label “species 2”. The identification label in the jar has “type” written on it, indicating that the specimens are syntypes. A handwritten note in the jar indicates that Jeekel examined the specimens in 1976 and concluded that they were not conspecific. There are 16 further syntypes in the NMB (inventory number NMB-DIPL-00133a, NMB-DIPL-00134a and NMB-DIPL-00135a) under the name *Pratinus socialis* (Carl).

Gigantomorpha socialis (Carl, 1912), Paradoxosomatidae

socialis Carl, 1926: 457-459, figs 152-159 [*Siphonophora*].

Neu-Caledonien: Mt. Canala, 700-1000 m, Sept. 1911. Unspecified number of ♂.

The MHNG collection contains seven specimens in alcohol (MHNG-ARTO-14346). The identification labels both have “Ponié, Wald 500 m, N. Caled., Sarasin & Roux” written on them. This corresponds to one of the many localities listed in the original description, but

a footnote indicates that Carl based the species on an unspecified number of ♂ from Mt Canala and assumes that the others correspond, and so these specimens should probably not be considered syntypes. The specimens from the Mt Canala locality including several ♂ syntypes are in the NMB (inventory number NMB-DIPL-00387e). *Pterozonium socialis* (Carl, 1926), Siphonophoridae

solitarium Carl, 1909a: 252-253, fig. 1 [*Strongylosoma*]. Sumatra. Mus. Bern. Unspecified number of ♂.

No specimens found in the MHNG. The type series is presumably in the NMBE.

Sundanina solitaria (Carl, 1909), Paradoxosomatidae

solitarius Carl, 1912c: 168-169, pl. 6, fig. 27 [*Spirobolellus*].

Celebes (coll. Sarasin). One ♂.

No specimens found in the MHNG. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00150a).

Spirobolellus solitarius Carl, 1912, Spirobolellidae

solitarius Carl, 1926: 439-440, figs 116-118 [*Spirobolellus*].

Neu-Caledonien: Mt. Canala, 800-1000 m, Wald, 17. Sept. 1911. One ♂.

No specimens found in the MHNG. The ♂ holotype is in the NMB (inventory number NMB-DIPL-00373a). *Spirobolellus solitarius* Carl, 1926 is a junior homonym of *S. solitarius* Carl, 1912. Jeekel (2001) proposed the replacement name *S. duplus*.

Spirobolellus duplus Jeekel, 2001, Spirobolellidae

solitarius Carl, 1909b: 311-312, pl. 6, figs 5, 18, 24 [*Spirostreptus*].

Rubja (Ihangiro) im Gebüsch am Ngono-Fluss. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18484). The specimen is broken into three pieces and is accompanied by a small vial containing gonopods. A data label with "Rubja aus Ngono xi.08" written on it is attached to the central fragment with string. The identification labels in the jar both have "type! Rubja Dr. J. Carl" written on them, indicating that this specimen is the holotype.

Limnostreptus solitarius (Carl, 1909), Spirostreptidae

sparsepunctatum Carl, 1912c: 120-122, text fig. 9 [*Castanotherium*].

Bolowonglangi, 1200-1500 m ü. M., Süd-Celebes (coll. Sarasin). One ♀.

No specimens found in the MHNG collection. The ♀ holotype is in the NMB (inventory number NMB-DIPL-00119a).

Castanotherium sparsepunctatum Carl, 1912, Zephroiniidae

spinipleura Carl, 1941a: 366-369, figs 9-16 [*Sundanina*].

Nördliche Chin-Hills, Ober-Birma. E. G. Watson leg. 1893. British Museum. One ♂ and one ♀.

The MHNG collection contains a microscope slide preparation of the gonopod and the first, second, third and last legs of the ♂ syntype (MHNG-ARTO-14538). The specimens are in the BMNH. *Sundania spinipleura* was designated as the type species of *Enghoffosoma* Golovatch, 1993 in the original description of the genus. *Enghoffosoma spinipleurum* (Carl, 1941), Paradoxosomatidae

spinipleurus Carl, 1932: 444-446, figs 31-34 [*Xiphidiogonus*].

Palnis: Sholas bei Kodaikanal, Mariyanshola und Vandaravu, 2150-2350 m, 6.-14.IV. Unspecified number of ♂ and ♀.

The MHNG collection contains nine specimens in alcohol, in four vials. The first vial (MHNG-ARTO-14283) contains five specimens; the adult and one of the four juveniles have a pin running the length of the body. The data label has "Mariyanshola ♂ type and juveniles" written on it. The second vial (MHNG-ARTO-14285) contains three specimens, two of them with a pin running the length of the body, and a label with "Kodaikanal ♀♀" written on it. The third vial (MHNG-ARTO-14286) contains one specimen and a label with "Vandaravu ♂" written on it. The fourth vial (MHNG-ARTO-14284), which is without labels, contains fragments including gonopods. The label in the first tube indicates that Carl considered the ♂ to be the holotype, but this was not stated in the original description and therefore all of these specimens are syntypes. *Xiphidiogonus spinipleurus* was explicitly designated as the type species of the genus *Xiphidiogonus* Carl, 1932 in the original description.

Xiphidiogonus spinipleurus Carl, 1932, Paradoxosomatidae

spiralis Carl, 1909b: 352-354, pl. 8, fig. 46 [*Odontopyge*]. Njarugenje-Niansa (Central-Ruanda); Kerehe (Süd-Ost-Ruanda); Biaramuli (Ost-Ussuwi); Bukoba. Unspecified number of ♂ and ♀.

The MHNG collection contains 44 specimens in alcohol in three jars. The first jar (MHNG-ARTO-18517) contains four specimens, two of them broken. The identification labels in the jar have "Bukoba Dr J. Carl" and "types Bukoba J. Carl" written on them respectively, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18518) contains 22 specimens, four of them broken. The identification labels in the jar have "Njarugenje-Niansa J. Carl" and "types Ruanda central J. Carl" written on them respectively, indicating that the specimens are syntypes. The third jar (MHNG-ARTO-18519) contains parts of at least 16 specimens, eight of them broken and some apparently incomplete. There is also a vial containing gonopods. The original identification label in the jar has "Biaramuli" written on it, indicating that the specimens are syntypes. An undated typewritten label in the jar states that Hoffman identified these specimens as *Syndesmogenus spiralis* (Carl). There

are four syntypes in the ZMUH (Weidner, 1960) and four (two ♂, one ♀ and one damaged specimen referred to as “Paratypoide” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00184a).

Haplothysanus spiralis (Carl, 1909), Odontopygidae

squamosus Carl, 1912c: 161-163, pl. 6, figs 30-31, 34, text fig. 15 [*Trigoniulus*].

Posso-See (coll. Sarasin). One ♂ and one juvenile.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14310). The specimen, which has a pin running the length of the body, is in one vial, and the gonopods are in a separate, smaller vial. The pencil-written identification label has “Posso-See – Tomini-Golf, Celebes centr. ex coll. Sarasin” written on it and the specimen is presumably a syntype. There are two syntypes (referred to as “Typen” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00145a), implying that the number of specimens given in the original description was incorrect.

Trigoniulus squamosus Carl, 1912, Pachybolidae

stellatum Carl, 1912c: 122-124, text fig. 10 [*Castanotherium*].

Loka und Umgebung bis 1300 m ü. M., Süd-Celebes (coll. Sarasin). More than one ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14304). The identification labels have “types Loka Celebes mérid. coll. Sarasin” and “types Celebes mérid. coll. Sarasin” written on them respectively, indicating that the specimens are syntypes. There are seven syntypes (referred to as “Typen” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00120a).

Castanotherium stellatum Carl, 1912, Zephroniidae

straminipes Carl, 1909a: 256-257, figs 9, 16-18 [*Spirostreptus* (*Thyropygus*)].

Sumatra. W. Morton. One ♂.

No specimens found in the MHNG. There are two specimens collected by Morton in Sumatra in the MCZL under the name *Thyropygus straminipes*. One of them, which has a pin inserted behind the head and is broken into three parts and accompanied by a vial containing dissected parts, is almost certainly the holotype because as well as signs of having been studied it has the number of segments given in the original description. The other specimen, which is intact and shows no sign of study and has fewer segments than the specimen used for the original description, is not a type.

Gonoplectus straminipes (Carl, 1909), Harpagophoridae

studerii Carl, 1913a: 207-210, figs 4-5 [*Cordyloporus*].

Yonni, Sierra-Leone; zwischen Laub im Wald. Two ♂ and two ♀.

The MHNG collection contains two specimens in alcohol in two vials. The first vial (MHNG-ARTO-18534) con-

tains a specimen with a pin running the length of the body and a smaller vial holding gonopods. The second vial (MHNG-ARTO-18535) contains a specimen with a pin running the length of the body. The identification labels in the jar have “Sierra-Leone Volz” and “Sierra-Leone W. Volz” written on them respectively, indicating that they are syntypes. A handwritten label in the jar states that Hoffman selected the ♂ as lectotype in 1960, but the designation does not appear to have been formally published. The other two syntypes are presumably in the NMBE.

Tylodesmus studeri (Carl, 1913), Chelodesmidae

subcylindricus Carl, 1932: 452-454, figs 44-49 [*Paranedyopus*].

Palnis: Kaffeetälchen bei Kukkal, ca. 1900 m, 2.IV. Travancore: Grosser Wald im oberen Vattavadaï-Tal, ca. 1800 m, 10.IV. Unspecified number of ♂, ♀ and juveniles.

The MHNG collection contains five specimens in alcohol in two vials. The first vial (MHNG-ARTO-18559) contains two specimens, both with a pin running the length of the body. The data label has “♀, ♂ juv. Vattavardai” written on it. The second vial (MHNG-ARTO-18560) contains two smaller vials, one holding three specimens, each with a pin running the length of the body, two of them broken, and the other with dissected parts including gonopods. The data label in the larger vial has “Palnis Kukkal” written on it. All of these specimens are syntypes. *P. subcylindricus* is the type species of the genus *Paranedyopus* Carl, 1932 by monotypy (Jeekel, 1971).

Anoplodesmus subcylindricus (Carl, 1932), Paradoxosomatidae

subterraneus Carl, 1926: 437-438, figs 112-113 [*Spirobolellus*].

Neu-Caledonien: Ngoï-Tal, 200 m, in der Erde, 16. Sep. 1911. Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14336). The specimen has a pin running the length of the body. The identification label has “Ngoje N. Caledonie” written on it, indicating that the specimen is a syntype. There are four syntypes (♂ and ♀ referred to as “Typus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00371a).

Spirobolellus subterraneus Carl, 1926, Spirobolellidae

subvalidus Carl, 1941b: 663-665, figs 140-148 [*Thyropygus*].

Shevaroy-Hills: Yerkaud. J. R. Henderson leg. 1894, British Museum. Three ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14520). The identification labels in the jar have “Shevaroy's Henderson” and “♂ cotype Yerkaud (Shevaroy Hills) Henderson 1894” written on them respectively. The other syntypes were not located in the

BMNH and may be lost. *Thyropygus subvalidus* was designated as the type species of the genus *Carlogonus* Demange, 1961 in the original description of the genus. *Carlogonus subvalidus* (Carl, 1941), Harpagophoridae

sulcifer Carl, 1932: 504, fig. 141 [*Pagodesmus*].

Nilgiris: Coonoor, kleine Dschungel, 1500 m, unter Holz, 9.I. More than one juvenile ♀.

The MHNG collection contains parts of at least five specimens in alcohol (MHNG-ARTO-18615). Some of the specimens are in fragments and may be incomplete. The data label has "Nilgiris, Coonoor, petite jungle" written on it, indicating that these specimens are syntypes.

Pagodesmus sulcifer Carl, 1932, Pyrgodesmidae

sumatranus Carl, 1906: 243-245, figs 15-18 [*Trachelomegalus*].

Sumatra (Coll. Mösch et Coll. Schneider). Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol in two jars. The first jar (MHNG-ARTO-14441) contains two specimens; one has a pin running the length of the body, the other is broken into three pieces. There is also a vial containing gonopods. The identification labels in the jar both have "Sumatra coll. Schneider" written on them and there is a printed "Type" label, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-14442) contains one broken specimen. The pencil-written identification label has "Sumatra G. Schneider" written on it, indicating that the specimens are syntypes. There are also three specimens (one ♂ and two ♀ referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00232a) which are probably syntypes.

Atopochetus sumatranus (Carl, 1906), Pachybolidae

suspectum Carl, 1912c: 109 [*Castanotherium*].

Mapane am Golf von Tomini, Central-Celebes (coll. Sarasin). One damaged ♀.

No specimens found in the MHNG. The ♀ holotype is in the NMB (inventory number NMB-DIPL-00113a).

Castanotherium suspectum Carl, 1912, Zephroniidae

suspensus Carl, 1918: 439-441, figs 16-18 [*Polyconocerus* (*Polyconoceras*)].

Iles Palau. Musée de Bâle. One ♂ and one ♀.

No specimens found in the MHNG. The two syntypes (one ♂ and one ♀ referred to as "Typus" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00339a).

Salpidobolus suspensus (Carl, 1918), Rhinocricidae

suteri Carl, 1902: 629-631, pl. 11, figs 50-52 [*Icosidesmus*].

Neuseeland, Nordinsel, Suter (Basler Museum). Two ♂ and one ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18628). The specimen has a pin running

the length of the body. The identification labels in the jar have "N^{elle} Zélande Suter" and "♂ type N^{lle} Zélande (Nord) Suter" written on them respectively, indicating that the specimen is a syntype. The MHNG also has a microscope slide preparation of gonopods and legs (MHNG-ARTO-18629); it is not clear if these belong to the specimen in alcohol or to the other ♂ syntype. There are two ♀ regarded as syntypes in the NMB (inventory number NMB-DIPL-00469a), implying that the sex of the specimens given in the original description might be incorrect.

Icosidesmus (*Icosidesmus*) *suteri* Carl, 1902, Dalodesmidae

taeniatus Carl, 1926: 431-433, figs 97-101 [*Spirobolellus*].

Neu-Caledonien: Hienghène; Insel Ouedjo, bei Hienghène, Juni 1911; Koné und Station am Koné-Fluss, Aug. 1911; Mt. Canala; Ngoï-Tal, zwischen Pandanus-Blättern, 16. Sept. 1911; Umgebung von Nouméa; Yaté, März 1912; Prony, März 1912. Loyalty-Inseln: Ouvéa, Fayaoué, Mai 1912; Lifou, Képénéé und Nathalo, April 1912; Maré, Médou und Nétché, Dez. 1911. Unspecified number of ♂ (♀ not mentioned explicitly).

The MHNG collection contains 14 specimens in alcohol (MHNG-ARTO-14334). The identification label has "Fayaoué (Ouvea) Loyalty" written on it, indicating that the specimens are syntypes. There are around 40 syntypes (♂ and ♀ referred to as "Typus" in the NMB catalogue) in the NMB (inventory numbers NMB-DIPL-00367a to NMB-DIPL-00367o).

Spirobolellus taeniatus Carl, 1926, Spirobolellidae

tamilum Carl, 1932: 434-436, figs 16-18 [*Polydrepanum*].

Süd-Indien: "Madras", J. R. Henderson leg. (Brit. Museum). Three ♂ and three ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14392). The specimens, each have a pin running the length of the body, are in a small vial and there are gonopods and legs in a smaller vial. The label in the large vial housing the two smaller ones has "Polydrepanum tamilum Carl, ♂♀ cotypes, ♂ type gonop., pattes 1, 2, 7, Madras Henderson leg." written on it, indicating that the specimens are syntypes. Jeekel (1980a) says that the other syntypes "are obviously preserved" in the BMNH, and there are syntypes in their collection; for some reason he referred to the species as *P. tamulum*. *Polydrepanum tamilum* is the type species of the genus *Polydrepanum* Carl, 1932 by monotypy (Jeekel, 1971).

Polydrepanum tamilum Carl, 1932, Paradoxosomatidae

ternetzi Carl, 1918: 428-431, figs 7-8 [*Trichogonos-treptus*].

San José, Paraguay, Dr Ternetz leg. Musée de Bâle. One ♂ and one ♀.

No specimens found in the MHNG. The syntypes (one ♂ and one ♀ referred to as "Typus" in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00337a).

Trichogonostreptus ternetzi is the type species of the genus *Trichogonostreptus* Carl, 1918 by monotypy (Jeekel, 1971).

Trichogonostreptus (Trichogonostreptus) ternetzi Carl, 1918, Spirostreptidae

tesselatum Carl, 1909b: 294-296, pl. 6, fig. 4 [*Strongylosoma*].

Kampala (Uganda) und Jinja (Busoga) in sumpfigen Talböden. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol in two jars. The first jar (MHNG-ARTO-18574) contains a vial holding a broken specimen and a smaller vial holding dissected parts including gonopods. A typewritten label in the larger vial states that Hoffman selected this specimen as lectotype in 1972. The original identification label in the jar has “types! Kampala J. Carl” written on it, indicating that the specimen is part of the type series. An undated typewritten label states that Hoffman identified the specimen as *Ectodesmus tesselatum* (Carl). The second jar (MHNG-ARTO-18575) contains a vial holding four specimens, two with pins running the length of the body. An original identification label in the tube has “Marsch bei Kampala” written on it, indicating that the specimens are part of the type series. A typewritten label in the jar states that Hoffman selected these specimens as “lectoparatypes” in 1972. The identification label in the jar has “Selon Hoffman Paradoxosomatidae *Ectodesmus tesselatum* (Carl)” typewritten on it. The lectotype designation does not seem to have been formally published and all of these specimens are therefore syntypes. There are two syntypes in the ZMUH (Weidner, 1960) and two in the MCZL.

Habrodesmus tesselatus (Carl, 1909), Paradoxosomatidae

transversezonatus Carl, 1912c: 193-195, text figs 28-32 [*Rhinocricus*].

Mapane, Golf von Tomini, Central-Celebes; Landschaft zwischen Posso-See und Tomini-Golf (coll. Sarasin). One ♂ and four ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-14317). One specimen has a pin running the length of the body, the other is broken into three pieces. The identification labels have “Mapane, Celebes cent. ex coll. Sarasin” written on them, indicating that the specimens are syntypes. The other three syntypes (referred to as “Typen” in the NMB catalogue) are in the NMB (inventory number NMB-DIPL-00164a).

Salpidobolus transversezonatus (Carl, 1912), Rhinocricidae

trichocephalus Carl, 1912c: 128-130 [*Rhinotus*].

Manipi, Süd-Celebes, bei ca. 800 m (coll. Sarasin). One ♀.

No specimens found in the MHNG. The ♀ holotype is in the NMB (inventory number NMB-DIPL-00125a).

Rhinotus trichocephalus Carl, 1912, Siphonotidae

tricolor Carl, 1902: 605-607, pl. 10, figs 32-33 [*Leptodesmus*].

Santa Catharina (Brasilien) (Basler Museum). Unspecified number of ♀.

No specimens found in the MHNG. There is one ♀ syntype (referred to as “Holotypus” in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00458a).

Leptodesmus tricolor Carl, 1902, Chelodesmidae

tricolor Carl, 1941b: 670-674, figs 159-165 [*Thyropygus*].

Nilgiris: Coonoor, 1500 und 1600 m, kleiner Urwald und Kaffeepflanzung Hillgrove, XII.1926. Three ♂.

The MHNG collection contains the three specimens in alcohol in two vials. The first vial (MHNG-ARTO-14521) contains one specimen and labels with “HillGrove Estate ob. Stufe 22.XII ♂” and “♂ type, 62 segm, Gonopod voir prépar.” written on them respectively. The second vial (MHNG-ARTO-14522) contains two specimens separated by a cottonwool plug; the lower has the head, segments with gonopods and other dissected parts in a smaller vial and a label with “♂ cotype 59 segm^{te}” written on it. The vial has a data label with “Kleiner Djungel bei Coonoor 24.XII ♂ ad.” written on it. No holotype was designated in the original description and all of these specimens are syntypes. There are also two microscope slide preparations: 1) a slide (MHNG-ARTO-14523) with the gonopods of the first specimen and 2) a slide (MHNG-ARTO-14524) with the first pair of legs and antennae of one of the specimens.

Gnomognathus tricolor (Carl, 1941), Harpagophoridae

trifida Carl, 1941a: 369-371, figs 17-22 [*Sundanina*].

Kanda, bei Bombay. Wroughton leg. 1893. British Museum. One ♂.

No specimens found in the MHNG collection. The holotype is in the BMNH.

“*Sundanina*” *trifida* Carl, 1941, Paradoxosomatidae

triseriatus Carl, 1912c: 154-156, pl. 5, fig. 18 [*Cryptodesmus*].

Soputan 1200 m, Nord-Celebes (coll. Sarasin). One ♀.

No specimens found in the MHNG. The ♀ holotype is in the NMB (inventory number NMB-DIPL-00140a).

Cryptodesmus triseriatus Carl, 1912, Cryptodesmidae

tuberculatus Carl, 1932: 493-495, figs 119-122 [*Archandrodesmus*].

Nilgiris: Dodabetta, Reserved Forest, 2400 m, 11.I, unter faulen Stämmen; Elk-Hill, Reserved Forest, 2300 m; Karteri-Tälchen, unterhalb Coonoor, 1550 m, 2.I. One ♂ and an unspecified number of ♀ and juveniles.

The MHNG collection contains 15 specimens in alcohol, in two jars. The first jar contains two vials; the first tube (MHNG-ARTO-14287) contains one specimen and a data label with “Nilgiris, Bangitappali” written on it. This locality is not listed in the original description and the specimens may not be syntypes. The second vial

(MHNG-ARTO-14288) is divided by a cotton wool plug; one section contains one specimen and a data label with "Nilgiris, Vallée de Karteri" written on it, the other contains three specimens and a data label with "Nilgiris, Elk.Hill R. F." written on it. The specimens in this vial are syntypes. The second jar (MHNG-ARTO-18608) contains a vial holding parts of at least ten specimens and a small vial containing dissected parts. The data label has "Nilgiris Dodabetta R.F." written on it, indicating that these specimens are syntypes.

Cryptocorypha tuberculata (Carl, 1932), Pyrgodesmidae

unicolor Carl, 1902: 609-611, pl. 11, figs 35-36 [*Aceratophallus*].

St-José (Costarica), P. Biolley (Genfer Museum). Two ♂. The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18551). Both have a pin running the length of the body. Each is in a vial and there are two other vials containing gonopods. Both of the identification labels in the jar have "♂ types St José, Costarica P. Biolley" written on them, indicating that the specimens are syntypes. *Aceratophallus unicolor* is the type species of the genus *Aceratophallus* Carl, 1902 by monotypy (Jeekel, 1971).

Aceratophallus unicolor unicolor Carl 1902, Rha-chodesmidae

urbicola Carl, 1909b: 361-362, pl. 7, figs 37-38 [*Odon-topyge*].

Daressalam, im Naturpark beim Hotel Kaiserhof. Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-18520). All of the specimens are broken, two are reinforced with pins, and they are accompanied by a tube containing gonopods. Both of the identification labels in the jar have "Daressalam J. Carl" written on them, indicating that the specimens are syntypes. An undated typewritten label in the jar states that Hoffman identified the specimens as *Prionopetalum urbiculum* (Carl).

Prionopetalum urbicola (Carl, 1909), Odontopygidae

vagans Carl, 1941b: 589-592, figs 24-35 [*Diopsiulus (Plusiochaeturus)*].

Nilgiris: Alter Weg unterhalb Coonoor, ca. 1500 m und im Erdmulm des Urwalds, unter dicker Laubdecke, XII.1926 und I.1927. Unspecified number of ♂ and ♀.

The MHNG collection contains 14 specimens in alcohol in four vials. The first vial (MHNG-ARTO-14478) contains two specimens and a label with "Diopsiulus vagans Carl ♂♂ Coonoor 4.I.27" written on it. The second vial (MHNG-ARTO-14479) contains three specimens, two of them broken into several pieces, and labels with "Alter Nilgiris ca. 3 Meilen unterhalb Coonoor 4.I.27", "Diopsiulus vagans Carl Coonoor" and "Alter Nilgiris Coonoor 4.I Präp Diopsiulus II" written on them respectively. The third vial (MHNG-

ARTO-14480) contains six specimens and labels with "Diopsiulus vagans Carl, Coonoor, 2♂♂, 1♀, juv." and "Stemmiulidae! ♂♀ juv. Coonoor 24-29.XII. Unter dicker Laubdecke, in Erdmulden des Waldes, feucht & schlaffig" written on them respectively. The fourth vial (MHNG-ARTO-14481) contains three broken specimens and a label with "Diopsiulus vagans Carl 3♀♀ Coonoor, 4.I.27" written on it. All of these specimens are syntypes. There are three microscope slide preparations, one labelled "Diopsiulus II vagans Carl Coonoor" and the others "Diopsiulus II", one of which has locality data. 1) a slide (MHNG-ARTO-14482) with gonopods, legs 1, 2, 3 and 9 and antennae; 2) a slide (MHNG-ARTO-14483) with gonopods, legs 1 and 2 and hypostoma; 3) a slide (MHNG-ARTO-14484) with legs 1, 2 and 3 and the hypostoma of a ♀.

Stemmiulus vagans (Carl, 1941), Stemmiulidae

vagans Carl, 1909b: 291-293, pl. 6, fig. 3 [*Strongylosoma*]. Vom Kagera durch die Südecke von Karagwe bis Ost-Ussuwi und von hier, seltener werdend, nördlich bis gegen Rubja in der Residentur Bukoba. Unspecified number of ♂ and ♀.

The MHNG collection contains 38 specimens in alcohol in two jars. The first jar (MHNG-ARTO-18576) contains 19 specimens, six of them broken and one with a pin running the length of the body. The data label has "Njarowungo XI.08" written on it and the identification label in the jar has "Strongylosoma vagans n. sp. Carl" written on it, indicating that the specimens are syntypes. The second jar (MHNG-ARTO-18577) contains 19 specimens, one with a pin running the length of the body. The identification labels in the jar have "Biaramuli J. Carl" and "types, Ost-Ussuwi J. Carl" written on them respectively, indicating that the specimens are syntypes. More recent, although undated, labels in both jars have "selon Hoffman: Paradoxosomatitae Xanthodesmus vagans (Carl)" typewritten on them. There are three syntypes in the ZMUH (Weidner, 1960), five in the MCZL, three in the NMB (inventory number NMB-DIPL-00170a) and three in the ZMHB (Moritz & Fischer, 1978a). Four specimens are listed in the accession catalogue of the MTD (No. 388), but these were destroyed in the Second World War. *Xanthodesmus vagans* (Carl, 1909), Paradoxosomatidae

valdai multituberculatus Carl, 1905: 275-276 [*Oxydesmus*].

Cabo St Juan. One ♀.

No specimens found in the MHNG collection. According to Andrés Cobeta (2001: 67) there are two specimens collected by Escalera at the type locality in the MNCN (MNCN 20.07/1185) although neither is explicitly called a type.

Scytodesmus multituberculatus (Carl, 1905), Oxydesmidae

variegatus Carl, 1902: 626-628, pl. 11, figs 46-48 [*Icosidesmus*].

Neuseeland, Nordinsel, H. Suter (Berner Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18631). The identification labels in the jar have “N^{elle} Zélande Suter-Naef” and “♂ type N^{lle} Zélande (Nord) Suter” written on them respectively, indicating that the specimen is a syntype. The other syntypes are presumably in the NMBE.

Icosidesmus (Icosidesmus) variegatus Carl, 1902, Dalodesmidae

velox Carl, 1912a: 271-272, figs 1-4 [*Trigoniulus*].

Aru-Archipel: Dobo, Wangil (Wald, in Baumstämmen und in der Erde) und Durdjela, Wammer, Samang und Sungi Panua auf Wokam, Seltutti und am Sungi Kolobobo auf Kobroor. Kei-Archipel: Kei-Dulah. Unspecified series, only ♂ mentioned explicitly.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-14438). Two of the specimens have pins running part of the length of the body. The identification labels in the jar both have “Iles Key ex. coll. Merton” written on them and there is a printed “Type” label, indicating that the specimens are syntypes. The SMF collection contains 19 specimens in alcohol in eleven jars (SMF 1353, 1378, 1380, 1383, 1384, 1391, 1393, 1395, 1396, 1434, 1436) from Wammer Insel (Aroe), Dobo (Wammer Insel), Sungi Kolobobo (Kobroor), Durjela (Wammer Insel), zw. Dobo u. Wangil, Wakum and Aroe. There are at least six ♂ specimens. After examination of the types the ♂ and dissected gonopods (SMF 1395) with “Aroe: Wammer-Ins., Durjela, Merton, 1908” written on the identification label is hereby designated as lectotype. *Trigoniulus velox* was designated as the type species of the genus *Eucarlia* Brölemann, 1913 in the original description (Jeekel, 1971).

Eucarlia velox (Carl, 1912), Pachybolidae

velutinus Carl, 1906: 232-233, figs 19-22 [*Sphaeropoeus*]. Sumatra: Deli und Karoo-Hocheben am Fuss des Vulkans Si-Nabung (Coll. G. Schneider). Unspecified number of ♂ and ♀.

The MHNG collection contains five specimens in alcohol (MHNG-ARTO-18448). The identification labels in the jar have “Sumatra, Schneider” and “Sumatra, Coll. Schneider” written on them respectively, indicating that the specimens are syntypes. The whereabouts of any other syntypes is unknown.

Sphaeropoeus velutinus Carl, 1906, Zephroniidae

velutinus xanthopleurus Carl, 1909a: 249-250 [*Sphaeropoeus*].

Sumatra (Coll. W. Morton und Museum Bern). Unspecified series.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO.18449). The specimen is accompanied

by a vial containing gonopods. The identification labels in the jar do not give any locality data, but the specimen is probably a syntype. There are two specimens collected by Morton in Sumatra in the MCZL which are syntypes, and presumably at least one other syntype in the NMBE. A junior synonym of *Sphaeropoeus velutinus* Carl, 1906, Zephroniidae

venusta Carl, 1914b: 916-917, figs 157-159 [*Trichomorpha*].

Zwischen Tambo und Bocca del Monte. Three ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-18543). The specimen, which has a pin running the length of the body, is in one vial while a smaller vial contains gonopods. The identification labels in the jar have “Colombie coll. Fuhrmann” and “Columbien Coll. Fuhrmann” written on them respectively, indicating that the specimen is a syntype. The whereabouts of the other syntypes is unknown.

Trichomorpha venusta Carl, 1914, Chelodesmidae

vermicularis Carl, 1909b: 348-350, pl. 7, fig. 40 [*Odontopyge*].

Biaramuli (Ost-Ussuwi). Unspecified number of ♂.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18521). Three of the specimens are broken, two are reinforced with pins. The identification labels in the jar have “Biaramuli J. Carl” and “type Ost-Ussuwi J. Carl” written on them respectively, indicating that the specimens are syntypes.

Allantogonus vermicularis (Carl, 1909), Odontopygidae

vicarius Carl, 1941b: 677-679, figs 171-172 [*Thyropygus*].

Animalais: Attakatti, 1000 m. One ♂ and one ♀.

The MHNG collection contains the two specimens in alcohol in two vials. The first vial (MHNG-ARTO-14526) contains one specimen broken into two pieces, two smaller vials, one containing gonopods and the other the head and anterior segments, and a label with “♂ type 64 segm.” written on it. The second vial (MHNG-ARTO-14527) contains one specimen broken into two pieces and a label with “♀ 64 segm^{te}” written on it. The identification labels in the jar both have “♂ type ♀ Animalais Voy. J. Carl” written on them, indicating that the specimens are syntypes.

Gnomognathus vicarius (Carl, 1941), Harpagophoridae

vicinus Carl, 1918: 423-424, fig. 3 [*Platyrrhacus (Pleorhacus)*].

Eitape, Nouvelle Guinée. E. Wolf leg. One ♂.

No specimens found in the MHNG. The SMF collection contains one ♂ specimen in alcohol accompanied by a microvial with dissected gonopods (SMF 1609). The identification label has “Neu-Guinea: Eitape, E. Wolf, 14.9.1909, ♂ Typus!” written on it, indicating that this specimen is the holotype.

Pleorhacus vicinus Carl, 1918, Platyrrhacidae

virgata Carl, 1914b: 914-916, figs 153-156 [*Trichomorpha*].

La Camelia bei Angelopolis; Girardot am Magdalena. Unspecified number of ♂ and ♀.

The MHNG collection contains four specimens in alcohol (MHNG-ARTO-18544). The specimens are in a large vial, three of them have pins running the length of the body. A smaller vial contains gonopods and legs. The identification labels in the jar both have "Colombie Coll. Fuhrmann" written on them, indicating that the specimens are syntypes. There are three ♀ syntypes (referred to as "Co-Typus" in the NMB catalogue) in the NMB (inventory number NMB-DIPL-00226a).

Trichomorpha virgata Carl, 1914, Chelodesmidae

virilis Carl, 1922: 570-572, figs G-K [*Gymnogonodesmus*].

Buitenzorg, in von Termiten bewohntem Holz und in der Erde eines Ameisennestes. One ♂ and more than one ♀. The MHNG collection contains three specimens in alcohol (MHNG-ARTO-18613). Both of the identification labels in the jar have "♀ Buitenzorg Buttell-Reepen" written on them, indicating that the specimens are syntypes. The MHNG also has a microscope slide preparation (MHNG-ARTO-18614) with the gonopods and vulvas of syntypes. *Gymnogonodesmus virilis* is the type species of the genus *Gymnogonodesmus* Carl, 1922 by monotypy (Jeekel, 1971).

Gymnogonodesmus virilis Carl, 1922, incertae sedis

volzi Carl, 1913a: 210-212, figs 6-7 [*Cryptodesmus*].

Yonni, Sierra-Leone. Two ♂ and many ♀.

The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18582). One of the specimens is broken. The identification labels in the jar have "Yonni (Sierra Leone) Volz" and "♀ Sierra Leone Volz" written on them respectively, indicating that the specimens are syntypes. An undated typewritten label in the jar states that Hoffman identified the specimens as *Aporodesmus pulcher* (Cook). The whereabouts of the other syntypes is unknown.

Cryptodesmus volzi Carl, 1913, Cryptodesmidae

volzi Carl, 1913a: 217-219, figs 11-12 [*Peridontopyge*].

Freetown, Sierra-Leone. One ♂.

No specimens found in the MHNG. The whereabouts of the holotype is unknown.

Peridontopyge volzi Carl, 1913, Odontopygidae

volzi Carl, 1906: 233-234, figs 7-11 [*Sphaeropoeus* (*Castanotherium*)].

Sumatra; Palembang (Dr. Volz); Indragiri (G. Schneider); Lahat (Museum Genf). Unspecified number of ♂ and ♀. The MHNG collection contains two specimens in alcohol (MHNG-ARTO-18450). The specimens are accompanied by a vial containing telopods. One of the identification labels in the jar has "♂ Sumatra, Coll. W. Volz" written

on it, indicating that the specimens are syntypes. Carl's original label does not give a locality, and it is possible that these specimens are really those listed as deposited in the MHNG in the original description and not specimens collected by Volz. The other syntypes are presumably in the NMBE.

Castanotherium volzi (Carl, 1906), Zephroniidae

willeyi Carl, 1932: 425-426, figs 6-7 [*Orthomorpha* (*Kalorthomorpha*)].

Ceylon: Kala Oya, XII 1905, Dr. A. Willey leg. (Brit. Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains a ♀ specimen and isolated gonopods in alcohol (MHNG-ARTO-14384). The intact specimen has a pin running the length of the body and is accompanied by a small vial containing the gonopods and a leg. The label in the large vial has "Orth. (Kalorthomorpha) willeyi Carl, ♀ cotype, ♂ gonopodes et 3e patte. Ceylon ex. Brit. Museum" written on it, indicating that the specimens are syntypes. The rest of the ♂ was returned to the BMNH. A handwritten label in the jar indicates that the specimens were studied by Jeekel in 1976. Jeekel (1980a) designated *Orthomorpha willeyi* as the type species of the genus *Pyragrogonus* Jeekel, 1980 in the original description of the genus.

Pyragrogonus willeyi (Carl, 1932), Paradoxosomatidae

xerophila Carl, 1909b: 336-337, pl. 7, figs 37-38 [*Odontopyge*].

Njarugenje (Central-Ruanda) im Grasland; zwischen Kagera und Mohasisee (Ost-Ruanda), vereinzelt im trocken Busch. Unspecified number of ♂.

The MHNG collection contains parts of at least three specimens in alcohol (MHNG-ARTO-18522). Two of the specimens are broken and two are reinforced with pins; the fragments of one of these are separated in a vial. A second vial contains dissected parts including gonopods. The identification labels in the jar have "Njarugenje", "Ruanda J. Carl" and "types Ruanda J. Carl" written on them respectively, indicating that the specimens are syntypes.

Prionopetalum xerophilum (Carl, 1909), Odontopygidae

xylophilus Carl, 1926: 438-439, figs 114-115 [*Spirobolellus*].

Neu-Caledonien: Oubatche, Wald, 600 m in faulem Holz, April 1911; Mt. Panié, Wald, 500 m, 27. Juni 1911. Two ♂ and two ♀.

No specimens found in the MHNG collection. The four syntypes (two ♂ and two ♀ referred to as "Typus" in the NMB catalogue) are in the NMB (inventory numbers NMB-DIPL-00372a and NMB-DIPL-00372b).

Spirobolellus xylophilus Carl, 1926, Spirobolellidae

yatensis Carl, 1926: 444-445, figs 127-128 [*Spirobolellus*].

Neu-Caledonien: Yaté ca. 500 m, März 1912. One ♂.

No specimens found in the MHNG collection. The ♂

holotype is in the NMB (inventory number NMB-DIPL-00377a).

Spirobolellus yatensis Carl, 1926, Spirobolellidae

zehntneri Carl, 1911: 404-407, figs 10-14 [*Mastodesmus*]. Java. Dr. L. Zehntner leg. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14289). The specimen, in a vial, is broken into two parts. A second vial contains fragments of gonopods. One of the identification labels in the jar has “type Java, Dr L. Zehntner” written and indicates that the specimen is the holotype, the other label is almost illegible. *Mastodesmus zehntneri* is the type species of the genus *Mastodesmus* Carl, 1911 by monotypy (Jeekel, 1971).

Mastodesmus zehntneri Carl, 1911, Polydesmidea incertae sedis

zehntneri Carl, 1902: 584-586, pl. 10, fig. 22 [*Orthomorpha*].

Java, Dr. L. Zehntner (Genfer Museum). Unspecified number of ♂ and ♀.

The MHNG collection contains 39 specimens in alcohol in six vials. The first vial (MHNG-ARTO-14395) contains one specimen broken into three parts and a smaller vial containing gonopods. A handwritten label reads “1♂ syntype *Orthomorpha zehntneri* Carl, Java leg. L. Zehntner” and a handwritten label in the jar states that this specimen was studied by Jeekel in 1976. The second vial (MHNG-ARTO-14396) contains two broken specimens and a smaller vial containing a gonopod. A handwritten label reads “*Orthomorpha zehntneri* Carl, Java leg. L. Zehntner”. The third vial (MHNG-ARTO-14397) contains two specimens, each with a pin running the length of the body. The fourth vial (MHNG-ARTO-14398) contains 11 specimens. The fifth tube (MHNG-ARTO-14399) contains 23 specimens. The sixth vial (MHNG-ARTO-14400) contains one broken specimen. The identification labels in the jar have the locality information “Java, Zehntner” and “Java, Dr L. Zehntner” written on them respectively, indicating that the specimens are syntypes. There is also a microscope slide preparation of gonopods (MHNG-ARTO-14535). There are two further syntypes in the NMB (inventory number NMB-DIPL-00452a).

Orthomorpha zehntneri Carl, 1902, Paradoxosomatidae

zehntneri Carl, 1912d: 510-512, pl. 9, figs 4-7, 9 [*Siphonophora*].

Dempuran, Java. Dr. L. Zehntner. Unspecified number of ♂ and ♀.

The MHNG collection contains 21 specimens in alcohol (MHNG-ARTO-14529). The identification labels in the jar have “Dempuran (Java) Dr L. Zehntner” written on them, indicating that the specimens are syntypes. *Siphonophora zehntneri* was designated as the type

species of the genus *Lomboknium* Jeekel, 2001 in the original description of the genus.

Lomboknium zehntneri (Carl, 1912), Siphonophoridae

zehntneri Carl, 1909a: 269-270, figs 15, 25 [*Spirostreptus* (*Thyropygus*)].

[Java, Zehntner]. Unspecified number of ♂ and ♀.

The MHNG collection contains seven specimens in alcohol (MHNG-ARTO-14528). Three of the specimens are broken, and there is a small vial with gonopods and other dissected parts. The identification labels in the jar have “Java Dr L. Zehntner” written on, indicating that the specimens are syntypes, and an undated typed label states that Hoffman studied the specimens.

Remulopygus zehntneri (Carl, 1909), Harpagophoridae

zonatus Carl, 1918: 462-465, figs 49-51 [*Messicobolus*]. Guatemala. Muséum de Genève. One ♂.

The MHNG collection contains one specimen in alcohol (MHNG-ARTO-14290). The specimen is broken into two parts, and the gonopods are in a separate vial in the jar. The data label has “Guatemala, Mr Oltramare” written on it. The identification labels have “type Guatemala, Mr Oltramare” written on them, indicating that the specimen is the holotype.

Messicobolus zonatus Carl, 1918, Messicobolidae

zonatus Carl, 1912c: 149-151, pl. 5, fig. 9 [*Platyrrhacus*]. Insel Kabaena, südlich von Celebes (Dr Elbert). Two ♂ and three ♀.

The MHNG collection has two specimens in alcohol (MHNG-ARTO-14291). The specimens, one of which has a pin running the length of the body, are in a vial along with a microvial containing the gonopods of the ♂. The identification labels have “Ile Kabaena, S. de Celebes, coll. Elbert” and “♂♀ types Ile Kabaena, S. de Celebes, coll. Elbert” written on them respectively, indicating that the specimens are syntypes. The SMF collection contains one ♂ and three ♀ (one of which is incomplete) in alcohol, accompanied by a microvial with dissected gonopods (SMF 861). The identification label has “Insel Kabaena, J. Elbert” written on it, indicating that the specimens are syntypes. *Platyrrhacus zonatus* Carl was designated as the type species of *Mastigorhacus* Jeekel, 2007 in the original description of the genus.

Mastigorhacus zonatus (Carl, 1912), Platyrrhacidae

Carl (1902) gave a description and illustrated the gonopod of some very much smaller specimens noted by Saussure & Humbert (1872) among those they identified as *S. mexicanus* (Saussure, 1859). Attems recognised that they represented a distinct species and named them *Sphaeriodesmus saussurei* Attems, 1899, apparently without having seen the specimens himself. The four syntypes are in the MHNG collection (MHNG-ARTO-18243 to MHNG-ARTO-18246). The MHNG collection also contains a number of specimens placed under names that were never published.

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Validation of five *Pselaphodes* species names in Huang & Yin (2019): The *Pselaphodes* (Coleoptera: Staphylinidae: Pselaphinae) of Nepal

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Abstract: The missing type depository information, along with a diagnosis of *Pselaphodes ampliatus* sp. nov., *P. bagmatius* sp. nov., *P. loebli* sp. nov., *P. rotundatus* sp. nov., and *P. symmetricus* sp. nov. are provided to validate the names under the conditions required by the ICZN (1999).

Keywords: Coleoptera - Staphylinidae - *Pselaphodes* - new species - nomenclature - type depository - ICZN

INTRODUCTION

We recently published an article (Huang & Yin, 2019) in which we described 15 new species of the genus *Pselaphodes*. It was subsequently brought to our attention, that for five of those 15 new species only the museum accession numbers of the type specimens were provided, but no explicit statement as to where they have been deposited. It can thus be argued that these five species do not meet the provisions of the International Code of Zoological Nomenclature (ICZN, 1999: Article 16.4.2) and that they should be treated as *nomina nuda*.

In order to correct this ambiguity, a statement of the type depository for these species is herewith made: all holotypes and paratypes of the new species have been deposited in the Muséum d'histoire naturelle, Geneva, Switzerland (MHNG), with each specimen bearing a unique accession number.

A diagnosis is provided here for each new species, but for detailed descriptions and figures we refer to Huang & Yin (2019).

RESULTS

Pselaphodes ampliatus Huang & Yin, sp. nov.

Type material (7 ex.): Holotype; MHNG-ENTO-43959; ♂; NEPAL, “NEPAL (Prov. Bagmati), Yangri Ridge, 4350 m, 22.IV.81, Löbl & Smetana” (MHNG). – Paratypes; MHNG-ENTO-43960 to 43963; 1 ♂, 3 ♀; NEPAL, same label data as holotype. – MHNG-ENTO-43964 to 43965; 1 ♂, 1 ♀; NEPAL,

same label data as holotype, except “4200 m, 21.IV.81” (all paratypes in MHNG).

Diagnosis: Male. Length 2.63-2.76 mm. Antennal clubs lacking modification. Metaventral processes long, apically broadened. Profemora with small ventral projection, protibiae with distinct projection at apex; mesotrochanters with slender ventral spine, mesotibiae with small projection at apex; metafemora broadly thickened ventrally. Median lobe of aedeagus narrowed apically; parameres slender and elongate. Female. May be identified only when associated with male.

Description and figures: Huang & Yin, 2019: 166; figs 1A, 2.

Pselaphodes bagmatius Huang & Yin, sp. nov.

Type material (3 ex.): Holotype; MHNG-ENTO-43966; ♂; NEPAL, “NEPAL (Prov. Bagmati), Malemchi, 2900 m, 14.IV.81, Löbl & Smetana” (MHNG). – Paratypes; MHNG-ENTO-43967 to 43968; 2 ♀; NEPAL, same label data as holotype (MHNG).

Diagnosis: Male. Length 3.06 mm. Antennomeres 9 with disc-shaped process at apex, antennomeres 10 with small projection at base. Metaventral processes long, apically broadened. Protrochanters with small ventral spine, profemora with big, blunt ventral spine, protibiae with slender spine at apex; mesotrochanters with acute ventral spine, mesotibiae with small projection at apex; metacoxae with sharp ventral spine. Median lobe of

aedeagus narrowed apically; parameres slender at base and broadening apically. Female. May be identified only when associated with male.

Description and figures: Huang & Yin, 2019: 168; figs 1B, 3.

***Pselaphodes loebli* Huang & Yin, sp. nov.**

Type material (9 ex.): Holotype; MHNG-ENTO-43999; ♂; NEPAL, “NEPAL (Prov. Bagmati), Malemchi, 2800 m, 14.IV.81, Löbl & Smetana” (MHNG). – Paratypes; MHNG-ENTO-44000 to 44007; 3 ♂, 5 ♀; NEPAL, same label data as holotype (MHNG).

Diagnosis: Male. Length 3.01–3.14 mm. Antennomeres IX with disc-shaped process at apex. Metaventral processes long, with pair of small projection in addition to long processes. Protochanters with slender ventral spine, profemora with large, blunt ventral spine, protibiae with acute spine at apex; mesotrochanters with multiple ventral spines, mesotibiae with small tubercle at apex. Median lobe of aedeagus almost symmetric, narrowing apically; parameres broad dorso-ventrally. Female. May be identified only when associated with male.

Description and figures: Huang & Yin, 2019: 177; figs 10A, 11.

***Pselaphodes rotundatus* Huang & Yin, sp. nov.**

Type material (5 ex.): Holotype; MHNG-ENTO-44063; ♂; NEPAL, “NEPAL (Prov. Bagmati), below Thare Pati, 3300 m, 11.IV.81, Löbl & Smetana” (MHNG). – Paratypes; MHNG-ENTO-44064 to 44066; 1 ♂, 2 ♀; NEPAL, same label data as holotype. – MHNG-ENTO-44067; paratype, 1 ♂; NEPAL, same label data as holotype, except “10.IV.81” (all paratypes in MHNG).

Diagnosis: Male. Length 3.10–3.13 mm. Antennomeres 9 with large disc-shaped process at apex, antennomeres 10 with small projection at base. Metaventral processes broad, forked at apex. Profemora with triangular ventral spine, protibiae with distinct spine at apex; mesotrochanters with slender ventral spine, mesotibiae with small projection at apex; metacoxae with short ventral projection. Median lobe of aedeagus broad and asymmetric at apex; parameres short. Female. May be identified only when associated with male.

Description and figures: Huang & Yin, 2019: 185; figs 16A, 17.

***Pselaphodes symmetricus* Huang & Yin, sp. nov.**

Type material (3 ex.): Holotype; MHNG-ENTO-44079; ♂; NEPAL, “NEPAL: distr. Kathmandu: Phulcoki, 2500 m, 30.IV.84, Löbl – Smetana” (MHNG). – Paratypes; MHNG-ENTO-44080; 1 ♀; NEPAL, same label data as holotype. – MHNG-ENTO-44081; 1 ♂; NEPAL, “NEPAL (Prov. Bagmati), Gul Bhanjyang, 2600 m, 6.IV.81, Löbl & Smetana” (both paratypes in MHNG).

Diagnosis: Male. Length 3.01–3.15 mm. Antennomeres 9 slightly concave on mesal surface, antennomeres 10 with large projection at base. Metaventral processes moderately long, with pair of small triangular projection in addition to elongate processes. Protochanters with slender ventral spine, profemora with blunt ventral spine, protibiae with large spine at apex; mesotrochanters with acute ventral spine, mesotibiae with small projection at apex. Median lobe of aedeagus symmetric, narrowed at apex; parameres short and symmetric. Female. May be identified only when associated with male.

Description and figures: Huang & Yin, 2019: 191; figs 19B, 21.

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ERRATUM

Erratum to “A revision of the trapdoor spider genus *Liphistius* (Mesothelae: Liphistiidae) in Peninsular Malaysia; part 2” [*Revue suisse de Zoologie* 126(2): 321-353]

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ERRATUM

In the original published version of this article Figure 17 was printed with garbled species names. This was due to a technical problem and concerned only the printed version, not the PDF version. The figure is therefore here reproduced correctly and the publisher apologises for this error.

REFERENCES

Schwendinger P.J., Syuhadah N., Lehmann-Graber C., Price L., Huber S., Hashim R., Subha B. Monod L. 2019. A revision of the trapdoor spider genus *Liphistius* (Mesothelae: Liphistiidae) in Peninsular Malaysia; part 2. *Revue suisse de Zoologie* 126(2): 321-353.

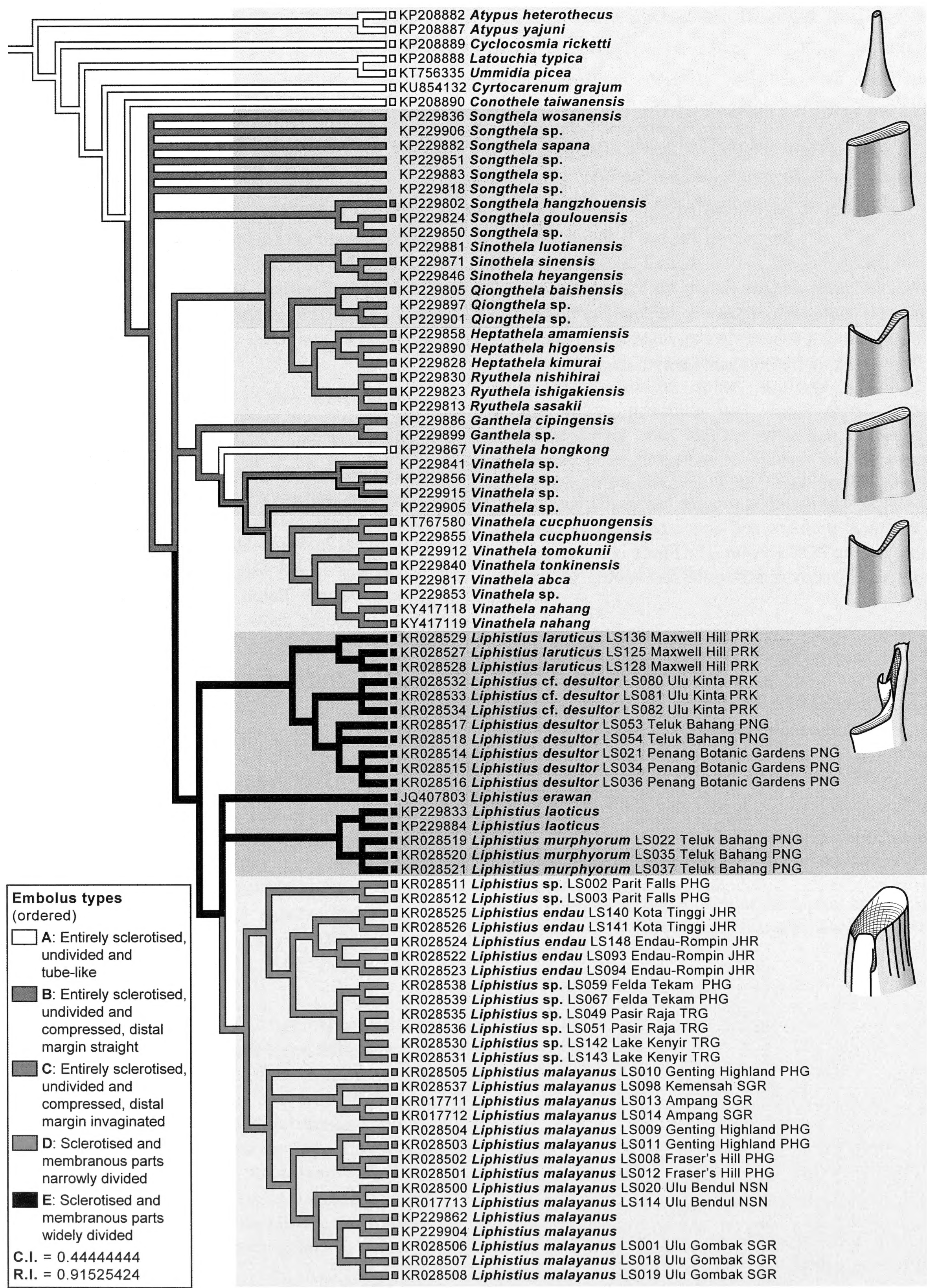


Fig. 17. Ancestral state reconstruction of embolus types: A = white, B = blue, C = green, D = yellow, E = black. Characters are mapped onto the maximum clade credibility tree from the Bayesian analysis. The consistency index and retention index, as well as schematic drawing for each character state are provided. Species in which the embolus type is known are marked with a small square at the end of the corresponding branches.

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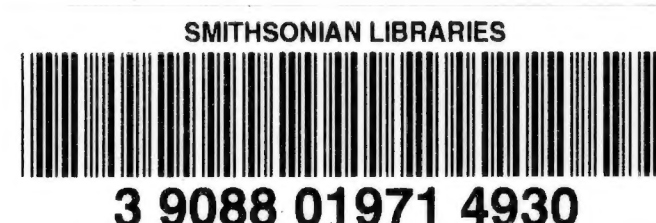
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